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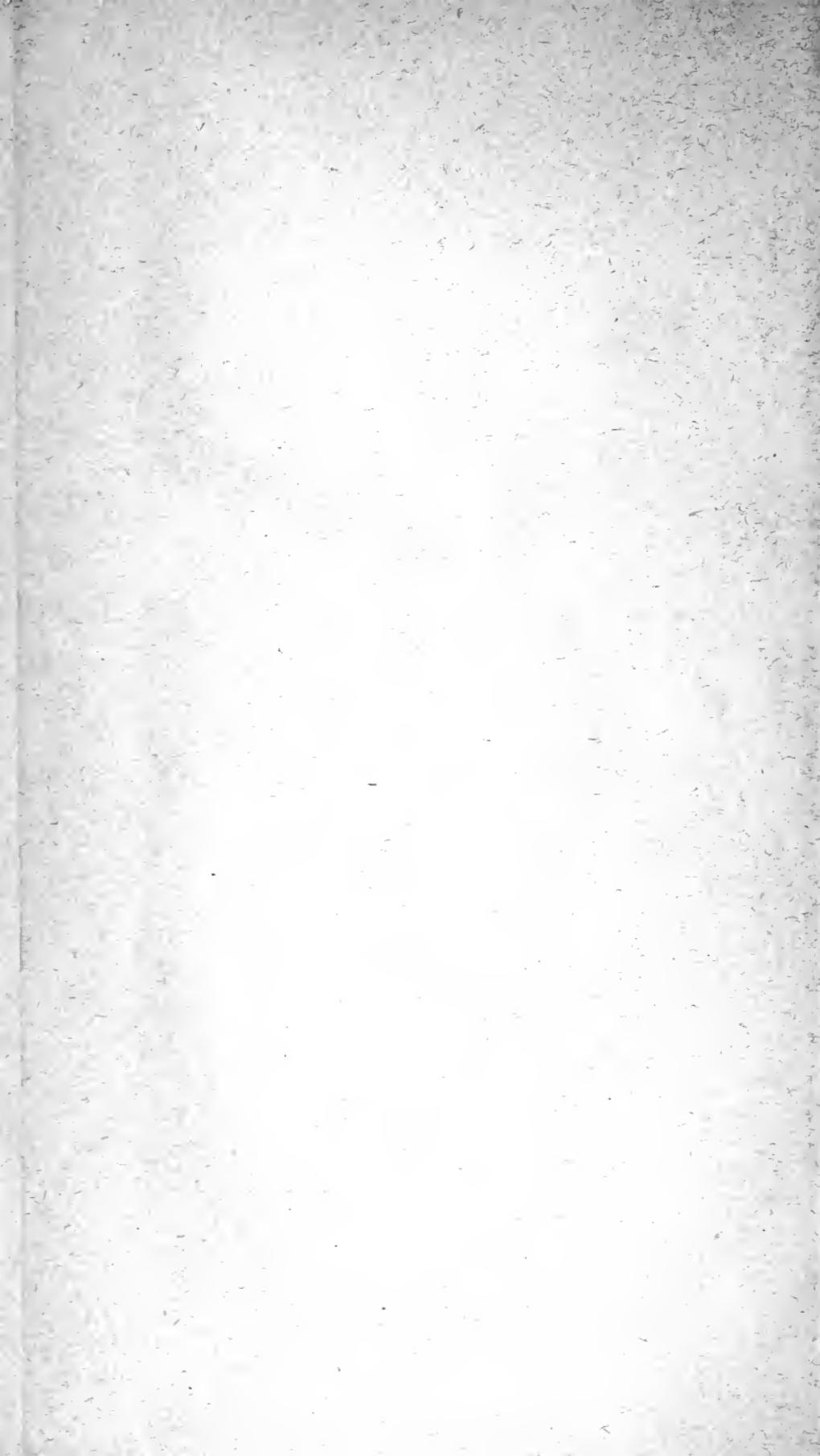
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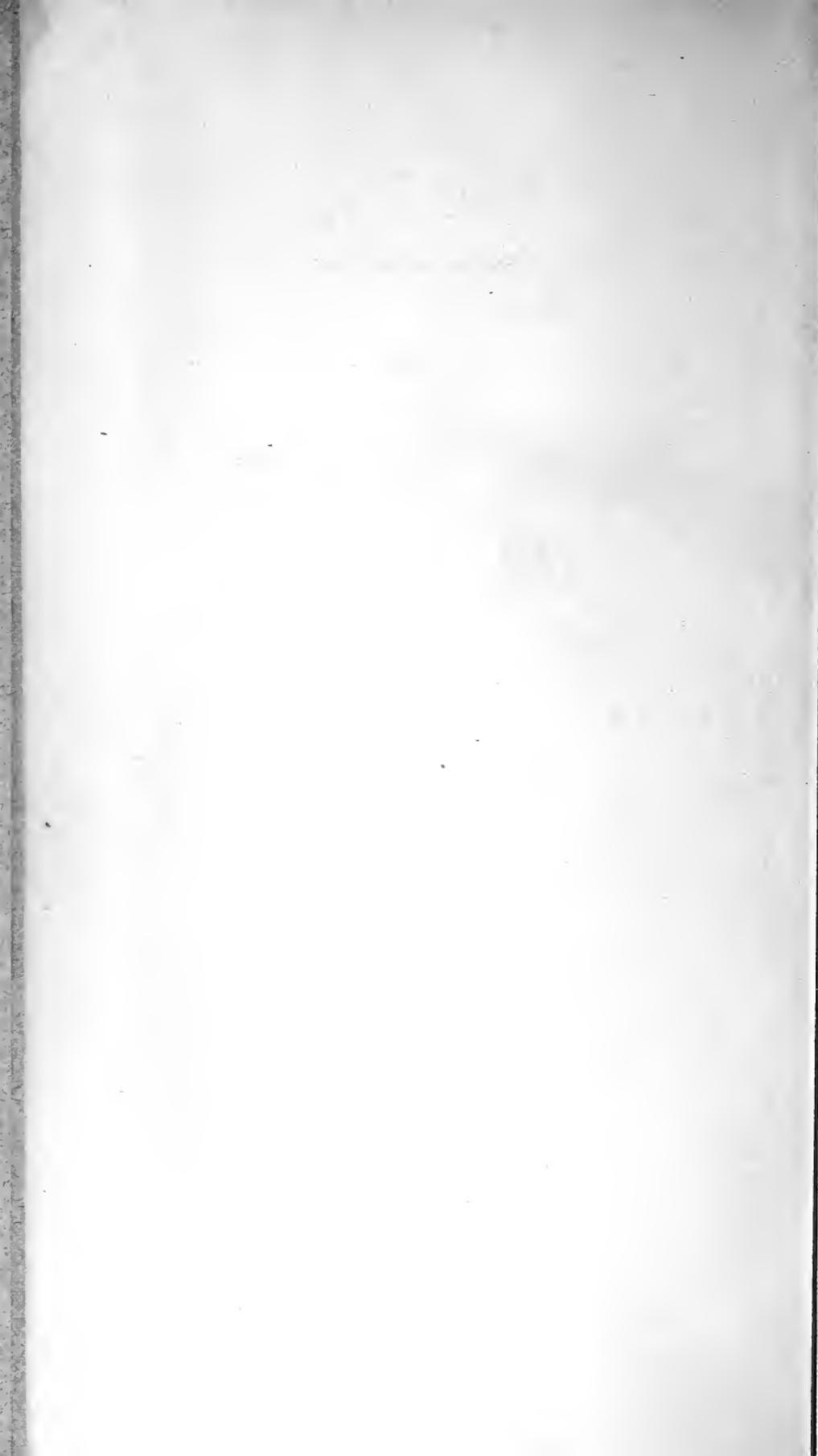
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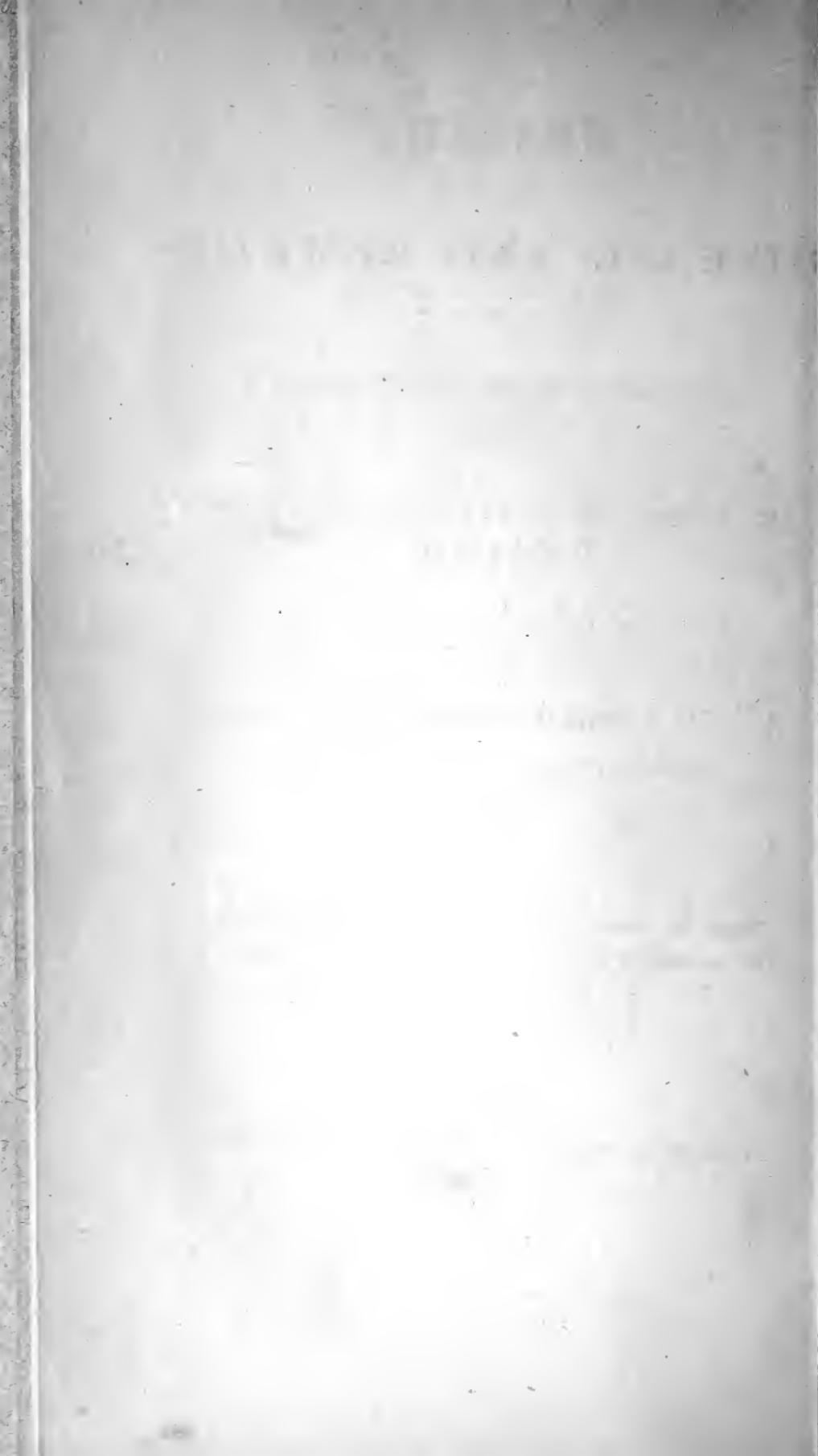
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HEALTH,

DISEASE AND REMEDY.



# HEALTH, DISEASE AND REMEDY

FAMILIARLY & PRACTICALLY CONSIDERED,

IN A FEW OF THEIR RELATIONS TO  
THE BLOOD.

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BY

GEORGE MOORE, M.D.

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS,  
ETC. ETC.

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Knowe that nature is weke in iij waies, either the selfe or by  
the annoiance of an other. Betwene these set your witte.

JOHN CAIUS, *Doctour in Phisicke*, 1552.

LONDON:  
LONGMAN, BROWN, GREEN, & LONGMANS,  
PATERNOSTER ROW.

1850.

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March 26, 1877.

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"God is He only that needs no help, and God hath created  
the physician for thine: therefore use him temperately, without  
violent confidence; and sweetly, without uncivil distrustings."

JEREMY TAYLOR.

## P R E F A C E.

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A PREFACE is usually an afterthought, intended to bespeak the reader's good opinion at the outset. In this case there is little to be said, as the book cannot be commended unless it speak for itself. Those readers, however, who are not disposed to examine the claims of one who stands at their service without a character, may be honestly informed that the book was written neither for fame nor for fees, but simply from the desire of being useful to both reader and writer. It is neither a popular compendium of physiology, a hand-book of physic, an art of healing made easy, a medical guide-book, a domestic medicine, a digest of odd scraps on digestion, nor a dry reduction of a better book, but rather a running comment on a few prominent truths in medical science, viewed according to the writer's own experience, and on the principles of common sense. The

object has been to assist the unprofessional reader to form a sober estimate of *Physic*, and enable him to second the physician's efforts to promote health: and throughout there has been a desire that even the professed medical student might, if he looked, find in the volume a few hints of some value to himself.

Of the six hundred or more recognised diseases, scarcely half-a-dozen are herein even alluded to; the physiology of health is but slightly touched, and remedial measures only incidentally considered. Nevertheless, many points of importance, and such as most persons ought to know, are stated, it may be, with sufficient clearness; and it is the writer's hope that his book will be found to accord well with the wish now uttered in one word from his heart—*Vale.*

G. M.

*May 1st, 1850.*

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ERRATA.

Page 142, for Taboof, read Taleef.

— 147, for Grafenburg, read Gräfenberg

## INTRODUCTION.

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HEALTH is a word of vast meaning; in relation to the body, it signifies the right working of all our physical functions; in relation to the mind, it expresses correct manifestation with respect to natural objects; and when applied to the soul, or the essential being of man himself, it means salvation, or eternal welfare, and a will in keeping with Heaven. Bodily health is our subject, and that only in a few of its bearings; the connexion of the mind with the nerves demands a separate treatment, and the sum and substance of all that can be said concerning health of soul will be found in the Bible. It is well, however, always to bear in mind the threefold relation of the word health, or rather it is desirable to form a more definite notion still, and if possible to apprehend what it is that constitutes well-being. It may be comprehensively defined in one word—order. Health is order; and order is the law of good in undisturbed operation. At first sight, this definition will appear true only in particular rela-

tions, but a little reflection will probably show that it applies to the well-being of the whole universe, whether of matter or of mind. Things are right only in right associations. As everything has its contrary as well as its opposite evil exists, but only to evince the overruling power of the Supreme Ordainer. In short, health can signify no other than the will of God as expressed in the perfect individual existence of other beings. As it respects a conscious and rational creature such as man, constituted in relation to the natural as well as the spiritual world, health is the correct and pleasant performance of all the functions of life and mind as evinced in the body, and the opposite condition is disease.

Some medical writers, for their own convenience, have made a distinction between disease and disorder, considering disorder to be only a functional irregularity, and disease an organic malady; but as a man may die from either, it is pretty evident that the distinction is rather in words than in fact, for although the physiologist should assert that death resulted only from functional disturbance, yet that a body is dead seems a sufficient proof of organic change, and it will prove but a small consolation to a man to be told that his pangs do not spring from disease, unless, indeed, the doctor can cure the disorder. By organic disease is generally meant a visible disorder of structure; that disease and disorder are, however, essentially the same thing, is clear from the circumstance that function and organism are united, and cannot be divided. The

state of the organ will always influence the function, just as a power applied to any machinery will produce effects according to the nature of the machine and the materials acted on. The power and function of the machine are dependent on its intrinsic mechanism, though set to work by an extrinsic influence. The mode of working is not visible in the vital organs, nor are the functions of life mechanical, except so far as they act in time and space:—who can say what causes nerve-action, or what change takes place in organism, antecedently and subsequently, when an unhappy thought disturbs digestion, or a violent passion produces palsy? But these are refinements which we do not desire now to discuss, the object in this work being to enter only so far into physiology as will suffice to explain a few of those general principles on which the body is formed, health preserved, and disease remedied; with the hope that what is written may be found both interesting and useful, and in some degree meet the demand for information which the writer believes to exist among unprofessional and intelligent readers.

Every reasonable person is well aware that the management of his own health at least, must greatly depend upon himself, and therefore, of course, he will be anxious to obtain whatever information may best promise to be useful to one who, though not bound to the study and practice of the healing art, yet daily finds occasion to consider what is right and what is wrong in relation to his own body. The

most direct way of arriving at practical conclusions will be to consider in the first place the nature and relations of the blood—

“The fountain whence the spirits flow,  
The generous stream that waters every part,  
And motion, vigour, and warm life conveys  
To every particle that moves or lives.”

## CHAPTER I.

### THE CHEMICAL AND VITAL RELATIONS OF THE BLOOD.

As every part of the body is formed from the blood, it follows that whatever elements enter into the composition of any organ, or production of the body, must have previously existed in the blood; for it is certain that no new element can be created by any natural process, and that one element cannot be converted into another. This will become evident if we reflect on the meaning of the word element. There are fifty-five substances known to chemists, which they denominate simple or elementary, because they are not acquainted with any means by which those substances can be decomposed. An element, then, as far as man's art and science are concerned, is an indestructible thing, the reverse of a compound, which may be destroyed as a compound by separating its component elements from each other.

About one-third of the whole number of known elements are found in the human body. Now if we

take any one of these, such, for instance, as the base of lime, calcium, (which we may mention the rather because it is an essential ingredient in the frame of man,) it requires no great reasoning power to prove that it cannot be converted into any other substance. To dream with the alchymists of actual transmutation is to imagine an absurdity, and to conclude that Omnipotence has not defined the natures of things, but left the materials of creation to find their places without having appointed their affinities, a state of confusion to be discovered only in the paradoxical chaos, the *concordia discors* of mere poetical philosophers.

As the combinations of the letters of the alphabet produce an incalculable number of words, so the combinations of the fifty-five elements produce an almost infinite number of compounds; and in fact all the varieties of nature within our knowledge result from these combinations. If we were to trace out the connexions of the substance we have instanced, calcium, we might fill a large volume with a description of them, since lime enters largely into almost all living bodies, and is the chief element among the solids of the earth. Hence it will be manifest that to study the combinations of the elements in our bodies requires much time and especial patience, and that to understand even the very small part of the subject which we propose to consider in this volume will demand something more than a mere cursory attention. In truth, an insurmountable difficulty presents itself at the very first step; for we cannot explain how the different ele-

ments take their places under the reciprocal influence of their different affinities in subserviency to life. We know, however, that the blood and thence also the various organs of the body are formed under the operation of those affinities, and also that every peculiar structure thus formed possesses the power, while alive, of separating peculiar principles from the blood for the promotion of its own development, for the preservation of its integrity, for its growth, and for the fulfilment of whatever function any part may bear in relation to the whole system.

In the commencement of an animate being some power resident in the egg (for all living creatures begin in an *ovum*) causes blood-vessels to appear as fast as the rudiments of the new creature take their form. They are soon seen communicating with each other and connecting the pulsating central point, the heart, with the whole periphery. Thus, the Divine finger traces out, in bounding lines and currents of blood, the outline of each organ, and fills up each with appropriate matter evolved from these minute and living streams. This matter is disposed and adjusted in forms perfectly adapted for the purpose of each organ, and the cells of which each part consists are laid in their places in such a manner as to fit each other more exactly than the cells in a honeycomb. Having fulfilled a momentary function, each solid particle is dissolved and borne away by the blood, while at the same instant another similar set of atoms forms a new cell that invisibly takes its place to act the same part. Thus, by the operation of an inscrutable agency, development is conducted

in three processes—1, of formation, as of the chicken from the egg; 2, of transformation, as of the butterfly from the caterpillar; 3, of completion, as from the infant to the man. Such a division is convenient by way of exemplification, but in fact formation and transformation are inseparable, and development, as a process tending to the bodily completion of a being, includes them both.

Everything in the body, and proceeding from it, is produced from the blood and through the blood-vessels. The ultimate blood-vessels are spun out into fine hollow threads, which are wrought into a marvellous variety of patterns of the most exquisite beauty, as seen through the microscope. These network patterns differ according to the nature and office of the organ to which they belong; they constitute the capillaries or hair-like vessels, and give to each part of the body the form peculiar to it. Through the coats of these gossamer threads the fluids pass from which the tissue of each organ is produced, and between their contents and the substances amidst which they are spread the chemical actions of life are carried on. Through them each organ obtains what it needs for development, growth, or sustentation; or, if its function so require, it thus removes from the blood what would be injurious if retained.

Before proceeding further, it will be desirable to obtain clear ideas of what is meant by *secretion* and *excretion*. Let us suppose a multitude of small porous and flexible tubes or pipes, and that these tubes are blood-vessels. These tubes lie in contact

with numerous organs, or rather their extremities are involved in those organs, constituting great part of their substance, and forming there a net-work of vessels. They are there without any opening, but appear as loops and turnings of the divided and subdivided, and yet connected and continuous, capillaries, through which the blood in the organs passes from arteries to veins, and from one side of the heart to the other. We will suppose all these tubes to be filled with a mixed fluid consisting of nearly forty ingredients like the blood, making together a bland emulsion, and flowing on in a perpetual current through the vessels. Now, to account for the production of all the fluids in the body, and proceeding from it, out of those contained in the circulating fluids, we must conceive that there resides in these finely organized vessels a power of separating, through their porous sides, whatever combination of the elements may suit the formation, growth, and function or office of each organ. The elements combine anew in the act of separating through the walls of the vessels. We will suppose the blood flowing in the liver, and the produced fluid we call the bile, which is collected in a multitude of fine tubes, all terminating in the gall-bladder. The process thus described is *secretion*. As each organ possesses the power of separating from the blood whatever is appropriate to build up the organism and sustain the function of each part, of course, the modes and results of secretion are as various as the organs themselves. Those things which are separated from the blood, not to subserve any further purpose in

the system, but to be carried off altogether from the body, are called *excretions*, (*excerno*, to separate from,) such, for instance, as that from the kidneys. All *excretions* contain either carbonic acid or else the elements of ammonia, (hydrogen and nitrogen,) with water and salts. Thus, the lungs emit *carbonic acid* and water, the kidneys separate *urea*, which consists of two proportions of carbon, with two of nitrogen, two of oxygen, and four of hydrogen, thus together constituting a hydrated cyanate of ammonia. The kidneys also convey away whatever salt the blood may furnish under particular states of the system, all of course dissolved in water. The skin excretes oily matter and certain salts of ammonia, soda, and potash, with acetic acid, carbonic acid, and water. The term *secretion* (*secerno*, to separate) is, however, with strict propriety generally applied both to the process and the product where anything is naturally separated from the blood. We perceive that both excretion and secretion are vital processes, and do not result from mere transudation or the filtering of fluids from the blood, for transudation is merely mechanical, and would furnish no such variety in the productions, but only a separation of the more fluid from the denser ingredients. Every part of the body is more or less porous, and would allow the watery parts gradually to exude and mix together if life did not prevent, but that pervading and uniting influence preserves each fluid in its place, and causes the timely separation from the blood of such things as subserve the demands and purposes of each organ, in such a manner as may be neces-

sary for the health of the whole. It is evident that some invisible agency is at work in the first construction of the body; and it is equally evident that this agency continues in operation throughout the whole period of our bodily existence. This agency we call life, but name it as we may, it can mean only the immediate expression, operation, and presence of Divine power.

How inconceivably exquisite must be the influences engaged in harmonizing the various materials of this mortal body to produce a new congruous living whole out of the *debris* and ruins of the numerous organisms that constitute our food! How wonderful the power that models every part according to a specific design, in such a manner that the peculiarity and character of each individual body shall be as marked and distinct in the minutest part as in the complete structure, in the blood-cell, as in the bony frame! Well might Galen write his discourses on the human body as hymns of praise to the Creator! Would that many men of like stamp might arise to celebrate in kindred strains the incessant discoveries of Divine Wisdom, as seen by the physiologist. But, in truth, the beautiful marvels of creative skill are everywhere equally evident to those spirits that regard all nature but as the visible work of an invisible hand; for the adaptation of atoms to each other results from the same touch that regulates all the worlds, and in whatever direction a man may look, he is alike impious if he own not God.

The agency that originates the body seems, as we have said, to occupy and develop it, and acting in

unity, under one design, evolves a united product out of innumerable ingredients. It causes the quickening of a new centre of life in an invisible point of blood, traces out, so to say, a plan of vessels and organs there, forms these in exact order and proportion from the vitalized fluid permeating every part, and, advancing atom by atom, slowly builds up a connected, complicated, living machine, consisting of nerves, arteries, veins, absorbent-vessels, muscles, tendons, bones, glands, various membranes, and many kinds of fluid, all mutually operating as one body; and while acting thus under the law and order of their formation, maintaining the whole in health, that it may subserve the nobler and more inscrutable being, the living soul.

The minutest division of this machinery has, then, a distinct chemical constitution, a vital action, and a microscopic anatomy—an anatomy, indeed, which no eye can see, and no hand touch, but His who made it. In this invisible arrangement, each element and atom is being incessantly directed to move into its place, and having served its purpose, to give way to other atoms. Thus, every organ reproduces itself, and the power that first separated and deposited the body from the blood, continues to separate and deposit it until life ceases. A process of dissolution and renewal is always going on, under which that which was produced from the blood is restored to it in altered relationships, to be modified by other influences, to be placed in new states in other parts of the economy, or if no longer needed, to be entirely removed through one of the many outlets

provided for that purpose, such as the lungs, the skin, the bowels, and the kidneys. Thus, by the perpetual entrance and exit of the elements of the body, a current of life, energy, and substance, is maintained in action and efficiency throughout the frame ; and this concurrence of the elements, when uninterrupted, we call a healthy body, because it answers the purposes of the mind without spontaneously producing pain and inconvenience.

A glance of the eye over a list of the ingredients which are found in our blood, will be sufficient to assure us of the direct and constant exercise of creative power, wisdom, and benevolence, in the provision made for sustaining the life, health, and strength of our bodies. A slight knowledge of those ingredients, and of their relations to each other, both when subjected to the influence of life, and when left to the uncontrolled play of their chemical affinities, will be sufficient to indicate, that it is our duty, as rational or moral agents, so to study the laws of our physical constitution, that we may be the better enabled to act in obedience to them in all our endeavours to improve the condition, either of ourselves or of others ; for rationally to obey the laws of nature, as those of God, is the only practical piety of man.

A considerable knowledge of chemistry is requisite to enable us to enter largely into the consideration of this part of our subject ; but as such a knowledge is unattainable by most persons, it is pleasant to reflect that a little attention to a few general principles, which common sense may easily apply, is all that is ordinarily required for the management of

those means for the preservation of our health, which lie within our own power.

The study of chemistry in relation to life is wonderfully interesting, and in every point of view of great practical importance. Its value in assisting our reasoning, while we endeavour to illustrate and understand the attributes of our Creator, is shown by the evidences presented to us in every step of our progress in that study ; for thus we see the benevolent wisdom that designed, and the power that regulates every atom of the material world, whether in the universal *cosmos*, or in the no less wondrous *microcosm* of our own existence. It would be invigorating to the heart and mind to pause here, and reflect on the innumerable arguments which we possess in our own bodies, and in our personal experiences, why we should honour, trust, and love our Maker. By thinking on the manner in which life is evolved and preserved in each of us, we cannot fail to discern that the Almighty, in every physical arrangement and affinity, is directly administering the means of happiness to his sentient creatures. In the minutest particulars of each living body, in its normal formation, and in every circumstance arranged by Providence for its accommodation, the same kind hand is ever to be traced ; and if there appear to be startling exceptions to this general law of kindness, if there be deformity, and pain, and death, what do these signify but that we should fix our minds beyond appearances, and rest assured that, as our reason thus refers us to the Omnipotent,

He will certainly reconcile all seeming contradictions to himself, and satisfy every soul that trusts Him.

The air around us, the measured diffusion of light and warmth, the alternations of day and night, the changes of the seasons, the pressure of the atmosphere, the proportion of muscular power to the demand of each part of the body, the adaptation of organ to organ, and of function to function, their united completeness in keeping alike with the universal plan of nature, and with the faculties of our minds, and with the right use of our senses, all these, and many inconceivable particulars, connected, as they all are, with the formation and distribution of the living current in our veins, prove that we now possess our being in Him who made us, and that he not only anticipates our exigencies, but, by our very necessities, would persuade us to confide in the goodness that alone and evermore must provide for us.

The truth of these observations will strike us the more powerfully the farther we advance in the knowledge of the forces engaged in our organization. The few paragraphs already written will suffice to show that the chemistry of organism and life is not the simple thing that it would appear to be from the off-hand manner in which the subject is generally treated by popular writers. The numerous and somewhat contradictory statements of the most skilful professors of the science prove it to be extremely intricate and difficult. We shall the more clearly perceive that this must be the case, if we confine our

attention for awhile to a few of the more prominent facts, concerning which philosophic chemists are agreed. Look at *the chemical constitution* of the blood for instance.

This fluid, according to the best authorities, contains the following proximate constituents:—

Proteine compounds . . . . .	Water. Fibrine. Albumen. Globuline.
Colouring matters . . . . .	Hæmatine. Hæmaphæine.
Extractive matters . . . . .	Alcoholic extract. Spirit extract. Water extract.
Fats . . . . .	Cholesterine. Seroline. Red and white solid fat, containing phosphorus. Margaric acid. Oleic acid.
Salts . . . . .	Iron (peroxide). Albuminate of soda. Phosphates of lime, magnesia, and soda. Chlorides of sodium and potassium. Lactate of soda. Oleate and margarate of soda.
Gases . . . . .	Oxygen. Nitrogen. Carbonic acid. Sulphur. Phosphorus.

The average proportions of all the principal constituents of the blood in 1000 parts, are given by Kirke and Paget thus :—

Water . . . . .	784.
Red corpuscles . . . . .	131.
Albumen of serum . . . . .	70.
Saline matters . . . . .	6.03
Extractive, fatty, and other matters . . . .	6.77
Fibrine . . . . .	2.2
	1000.

These ingredients vary considerably in their proportions in different individuals ; and in disease they undergo great modifications, traces of many substances being found under morbid conditions, which in health are not to be detected in the blood. Dr. J. F. Simon, of Berlin, a high authority, from whom the foregoing list is borrowed, enumerates fifteen substances which are found in diseased blood, but not in healthy. But the further enumeration of strange words will only puzzle the general reader, and the above table will sufficiently show that the study of pathology, in all its bearings on the chemical constitution of the blood, is no less minute than extensive, and altogether beyond the reach of those hasty generalizers who ignorantly speculate on the mysteries of medicine.

It may be reasonably questioned whether all the ingredients above stated are positively requisite to health : from facts within my own observation, it appears probable, that for some of them others may be substituted, for a time at least, without evident detriment to comfort and vigour. This substitution

applies, however, only to the salts, a much greater variety of which is furnished by our food than the foregoing list indicates. There is every probability that most of the salts taken into the stomach are carried into the blood without change, and almost every vegetable contains salts peculiar to its tribe, besides those incombustible compounds of potash, soda, lime, iron, magnesia, manganese, with sulphuric and phosphoric acids, and chlorine, and silica, which nearly all vegetables contain. It is chemically demonstrated, that different kinds of food produce very marked alterations in the state of the blood, and the growth of the body, but these variations do not depend so much on the essentially nutrient ingredients as on the different salts with which they may be combined. Substances that do not contain soda, potash, and lime, conjoined with some acid, are not naturally fit for aliment, and cannot be converted into blood, unless some such salts be taken with them. Thus, a man may starve on apparently the purest diet, if it do not contain a proper proportion of inorganic salts ; the white of eggs, for instance, although essentially nutritious, will not alone suffice to support life, some salt beyond what it naturally contains, being required to render it fit to meet all the demands of the vital economy. "Can that which is unsavoury be eaten without salt ? or is there any taste in the white of an egg ?" were pertinent questions for one to ask, who, like Job, relied on natural adaptations as proofs of God's Providence.

The term *proteine* occurs in the list of the consti-

tuents of the blood as descriptive of certain compounds; this term requires explanation. One of the most remarkable results of modern investigation is the discovery that albumen, or albumine, (the chief substance of egg), fibrine (the substance of flesh-fibre), and caseine (the substance of cheese) are but modifications of a compound which its discoverer, Mülder, called Proteine (from *πρωτεύω*, *I hold first rank*) because it is, as he supposes, the foundation of the whole body, the chief constituent of every organ; hence all substances containing its elements are called proteine compounds. Another discovery, equally interesting and important, assures us of the existence of this substance ready formed in vegetables, either in the form of albumine, fibrine, or caseine; but chiefly in those commonly used by man as food, from their known nutritious qualities. Thus, from the expressed juice of many vegetables, a separation takes place in a few minutes, and that which is deposited is vegetable fibrine, a substance which, when its colouring matter is removed, exactly resembles the fibrine of the blood. The juice of cauliflower, carrots, turnips, &c., being boiled, a substance separates in a coagulated form, which cannot be distinguished from the white of egg. This is vegetable albumine. From peas, beans, lentiles, and similar leguminous seeds, or pulse, vegetable caseine is obtained, which is precisely similar to the curd procured from milk. These three substances consist of the same organic elements united in the same proportions, and they are identical in composition with the chief constituents of the blood--animal fibrine, and albumen.

*Proteine* may be extracted in a state of purity from either of the fore-mentioned substances, by merely separating from them the salts with which they are mixed, so that proteine is proved to be the same thing as albumine, fibrine, and cheese, but without their respective salts ; the chief constituents of the blood are consequently, as Liebig says, compounds of this proteine, with variable proportions of inorganic substances.

If we compare the proportions per cent. of the ultimate elements of proteine with those of blood and flesh-fibre, we shall see at once how slight a change is needed to convert either into the others, and also learn that the ultimate elements of animal nutrition, irrespective of the salts, are but four—carbon, hydrogen, nitrogen, and oxygen.

BLOOD—(Liebig.)	FLESH—(Liebig.)
Carbon . . . . . 54.20	Carbon . . . . . 54.12
Hydrogen . . . . . 7.65	Hydrogen . . . . . 7.89
Nitrogen . . . . . 15.73	Nitrogen . . . . . 15.67
Oxygen . . . . . 22.12	Oxygen . . . . . 22.32

PROTEINE from Vegetable Albumen according to Mülder's Analysis.

Carbon . . . . .	54.99
Hydrogen . . . . .	6.87
Nitrogen . . . . .	15.66
Oxygen . . . . .	22.48

It is to be especially noticed, as Liebig states, that even in regard to the presence and relative amount of sulphur, phosphorus, and phosphate of lime, no difference can be observed between the fibrine, albumen, and caseine of vegetables, and

those obtained from animal substances; "they are not merely similar, but chemically identical."

Thus, we obtain a remarkable confirmation of the truth announced in the first chapter of Genesis, as respects the vegetable origin of all animal substances; for we now see that there is not a nutrient particle circulating in the blood which was not first formed in some tree or plant. Thus, all the leafy tribes, drawing nourishment from the warm air and the watered soil, act but as laboratories for the preparation of food for the sustentation of higher beings, from insects up to man, the ultimate end of the arrangement resolving itself into the life and enjoyment of conscious agents.

The vital functions of plants and animals constitute together one vast system of counterbalancing influences, the plant producing what the animal consumes, and the animal producing the food of the plant. The animal yields carbonic acid and ammonia, absorbs oxygen from the air, and consumes carbon, hydrogen, nitrogen, and oxygen, as solidified in its food; while the plant gives out oxygen, absorbs carbonic acid and salts of ammonia, and, decomposing what it absorbs by separating a portion of oxygen, which it emits, produces in its substance, and its fruit, those combinations of carbon, hydrogen, nitrogen, and oxygen, with salts, which form the food of herbivorous animals, while these in their turn furnish the materials obtained from plants in a state fitted for the use of the carnivorous. Water is the vehicle and solvent of all substances adapted to sustain life, whether animal or vegetable, and its

composition and decomposition, in conjunction with those other elements, carbon and nitrogen, are among the most surprising changes effected under the influence of life; but the value of this fluid we shall see most clearly as we proceed.

A slight incidental digression may be permitted. The existence of death as a means of sustaining and extending life is a wonderful ordinance. It appears that even before the human era of this earth, creatures were armed by their Maker with the means of destroying each other, and their continuance in existence was caused to depend on their success in so doing; and ever since man wandered from Paradise he, too, has been necessitated to contend with ravenous beasts, and to extend his dominion by conquering them and partaking of their prey.

The order of this world is an equilibrium between life and death, the production of the greatest variety in the forms, dispositions, and means of subsistence among living things, being evolved out of the incessant warfare of one against another, for propagation must cease unless destruction continue. This lavishment of bodily life upon instinctive ferocity signifies this much to us, at least—a perishing earthly being is of secondary importance. Doubtless the wisdom and benevolence of the arrangement by which the herb-eating animals become the prey of the rapacious, would be fully vindicated, if we but understood how all physical existence is made subservient to the elucidation of the higher wonders of the moral and spiritual world.

Jehovah is represented as saying to Noah—

“Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things;” (Gen. ix. 3;) thus putting in contrast the provision for sustaining life under the first and the second dispensations. (Gen. i. 29.) It is remarkable that the sacredness of life is enforced at the same time that the destruction of life is permitted, and that here, for the first time, we find the blood directly mentioned as the symbol and vehicle of life to be held sacred, and to be accounted for accordingly. The connexion between the sacrifice of life, or shedding of blood, and the doctrine of atonement and of self-dedication, has been observed through all nations and ages of the world; and it is this that stands prominent throughout the Bible, pointing ever to a revelation and a life yet to come, not only as regards man, but the whole creation, as the medium of manifesting the attributes of God.

The thoughtful man asks why must the defenceless die that the ferocious may live? Are the fierce more noble than the feeble? Believers in the Lamb of God boldly answer, No. The Christian, however, does not speculate, but patiently waits for the advancing light, in which he is to see creation consummated; and he now feels that to doubt the benevolence of the Creator is to deny Him. If we do not believe that Omnipotence will reconcile all things to Himself we do not reason to any rational end, but only revolve in the darkness of distrust if not of despair. As often as we behold the bow in the cloud indicating the harmony of heavenly light above the partial darkness surrounding us, let us

remember that God says to *us*, if we will but receive it, “ *This is the token of the covenant which I make between me and you, and every living creature* that is with you, for perpetual generations, a token of a covenant between me and the earth.”

If asked, What is the bearing of all this on health? it will suffice here to say, that nature and the Bible alike assure us that man is not a detached being, and that death is not the end of life. In our own frames, death is but the minister of life, and that in a manner which indicates the immediate connexion of our own existence with the rest of creation. Every material in our very organism is evidently influenced by the same power that pervades all other beings, for the great globe itself, with its atmosphere and planetary fellowship, is, so to say, in sympathy with our bodies, since our bones, our muscles, and every minute fibre of our flesh, and the very globules floating in our blood, are all adjusted and put in motion with relation to the world in which we dwell; so that all belonging to the formation and circulation of the blood within our veins ought to teach us that the Ruler of the universe is thinking of us for our good. But reason, receiving the word of revelation as the truth she needs, is enabled to look for a higher, an eternal health, as the boon of Him who originates and ends all; and any one feeling this, must own that to speak of life without mental reference to its everlasting nature and infinite importance in connexion with the thinking being, would be impious, preposterous, and absurd. If our limits would allow, it might easily be shown that every atom of our

blood is distinctly influenced by gravitation, electrical attraction, what is called elective affinity, and of course by heat and light, all of which are universal things. But those who know anything of physics are aware that all this is implied in the fact that the blood lives and circulates in every thread of the capillary network of our bodies; life indeed is preserved by the co-operation of influences within us and around us, that extend beyond the sun and into eternity: and the thinking being looks from its standing point still onwards to the infinite.

*The vitality of the blood* is probably best proved by the circumstances attending its coagulation. Soon after being drawn, the blood separates into two parts, the *clot*, or solid part, sinking in the *serum*, or liquid part. This separation cannot take place until the blood dies, for while alive, the vital influence keeps the respective particles in a state of mutual repulsion—that is to say, in a fluid state. The instant this repulsive agency is diminished by any means, the blood begins to coagulate, the fibrine, withdrawing from the fluid in which it was dissolved, partially involves the coloured particles, and, as they sink, forms the clot, while the water, with most of the salts, and the albumen of the blood, form the serum. This separation is not the effect of merely cooling the blood, for it takes place at the temperature of the body, and sometimes in the living vessels, and even in the heart itself, on great loss of blood. That it depends in some measure on chemical action, there is no doubt, but it is chemical action modified by another agency, for which we find no term but

life. This agency is evinced in the fact, that the blood that first flows from an animal bled to death remains uncoagulated five times as long as that which flows just immediately before death, or when faintness comes on. Fainting is the real commencement of death, but yet death is often arrested by fainting, as many a wounded soldier has experienced, for thus the bleeding from the smaller blood-vessels is stopped by the clotting of the blood.

The life of the blood is also proved by its capacity for organization; for if a clot of blood lie enveloped amidst the living tissues, it is apt to acquire blood-vessels of its own, and thus to become distinctly organized throughout its substance.

That the blood is alive, is also indicated by the fact, that it is the vehicle of life to every part of the body. As already shown, the changes it undergoes in the course of circulation are in no respect analogous to any merely inorganic changes. Now, as these changes are witnessed only in living bodies, the natural conclusion is, that they are as essentially associated with life as life is with organism.

Here it will be useful to obtain a clear idea of the meaning of the terms *organic* and *inorganic*. That is organic which enters into the formation of an organ. The elements of organic and inorganic matter are the same; they differ only in their manner of combination, all matter being inorganic until modified by life; thus the vegetable creation is the medium of transition between inorganic matter and the highest organisms. Substances that have not been organized are unfit for the food of animals, and

have a tendency to solidify or separate from solution in a crystalline and angular form, but organizable substances have a tendency to assume the form of minute globular cells or vesicles. The presence of organic and inorganic substances in certain proportions together in the same solution, tends to facilitate the formation of these cells. Each cell is organized, prepared for life, and indeed is a living thing, at least while in a living body; and moreover, it is "a laboratory in which gases are condensed into liquids, which, in their turn, are organized into textures."

It is evident from the preceding facts, that there is a universal law in operation, by which all the processes of nature tend to promote organization, and by which, also, organization is rendered subservient to the formation of blood, and the sustentation of life in higher and higher forms up to man, so that, even in respect to the provision made for our bodies, the human being appears as the most important of terrestrial things.

It is generally understood that the tissue of each organ is formed of microscopic cells, containing other bodies of very simple structure called *nuclei*. These cells assume different forms in the progress of development, according to the nature of the tissue to which they belong. They are everywhere arranged in exquisite order, and have a vital affinity according to the place they occupy, by which they take up from the blood just that part of it which is suited to the growth, nourishment, and function of the organ in which they exist.

When it is said that an election is made by an organ, of course the language is employed figuratively; but explain the fact as we may, it means only this—the Deity has so modified chemical and mechanical influences, as to make them subservient to life in such a manner, that, in living bodies, the elements do not operate on each other as they would in dead bodies, and thus the cells of the tissues attract their proper nutriment from the blood as it flows in perpetual rivulets about them.

A cell is a minute bag, or bladder, without opening, and every tissue is composed of a definite kind of cells, and new cells of the same kind are formed by the combination of fresh nutrient materials with the materials already formed. The cell, however, does not indiscriminately take up any substances in the blood, but only those that are in keeping with the substance of the cell itself, or that may be demanded by its condition (assimilation). “The several layers grow by assimilation, but when a new layer is being formed, different material from that of the previously formed layer is attracted.” (Schwann.) Thus the cells not only attract materials from the nutrient fluid, but they have also the faculty of producing chemical changes in the constituent particles of that fluid. In each particular organ there are, therefore, myriads of individual parts subserving important ends, both in relation to the function of the organ itself, and also in relation to the whole body. Hence it is easily seen how any disturbance in the living operation of one of these microscopic cells may be productive of general disorder. The

constitution of the blood must be adapted to the numerous affinities of these cells with wonderful precision, since the slightest interference with the right action of those affinities may cause the propagation of disease from cell to cell, and throughout the blood and nerves, so as to involve alike every atom of the body. This is demonstrated to our sight by the introduction of certain diseases, or of substances inimical to life. By inoculation with small-pox, for instance, an invisible portion of matter on the point of a needle being placed in contact with the living tissue, a disorder is immediately commenced, by which the whole body is very shortly so contaminated, that every thing in it, and proceeding from it, contains the seeds of the same disease, which will germinate in any body adapted to nourish them.

Some physiologists being impressed by the seemingly independent life and growth of these cells, as constituting the fabric of our bodies, have imagined that our frames are made up of microscopic animalcules, congregated together according to their species; and some say that *if* we could but detach a few of these living cells, and place them in favourable circumstances, they would live, and grow, and propagate. Schwann says they are as much individual and independent beings as the bees in a hive, and some naturalists seem to imply that, by good management, a blood-cell might be artificially developed into a man, so that the *homunculus* of the bombastic Paracelsus was not so very prodigious. Certainly Omnipotence *may* permit man to interfere with His own laws, and alter the order of crea-

tion, but, until then, with all due admiration, we must deem the man mad who talks of germinations independent of the generic lines drawn by Deity.

We find, as before said, that every particle of the body is in a constant process of change, and life is maintained by incessant action, which of course implies motion and resistance. Life is, in fact, evinced in resistance both to chemical and mechanical action, or rather it causes both to be exerted for the specific purposes of organization. In short, every part of the body is kept alive only by the continued act of removal and renewal of its particles, so that life consists only with the perpetual motion and chemical action of the materials which embody it.

The formation and assimilation of the nutrient fluid, blood, are then chemical processes carried on in living bodies, under certain conditions dependent on the co-operation of a marvellous variety of agencies, both in the body and around it. The influence of even inconceivably minute quantities of matter on the behaviour of other matter, is very wonderful. We may in a familiar manner illustrate this influence, as it must act on our own bodily composition by reference to what takes place in ordinary fermentation, and in similar chemical changes. If we place a little yeast in a solution of sugar, the yeast converts the sugar into carbonic acid and alcohol, while the yeast itself remains unaltered: If we mix together hydrogen and oxygen gases, (the constituents of water), they will not unite of their own accord; but if we place a coil of fine platinum wire in the mixture of gases, they unite and form

water, while the wire becomes red hot without being otherwise acted on. Thus, also, an acid converts starch into sugar, but undergoes no change itself. From these examples of mysterious action, we may in some faint degree apprehend the importance of many agents in the economy of life, which, while influencing us, undergo no corresponding changes themselves, and we need not wonder that the causes of disease, though manifestly acting on chemical principles, are nevertheless generally beyond the tests of chemical science.

We may now revert with advantage to what has been stated concerning the constituents of the blood. Health depends on the play of affinities between certain salts and the proteine-compounds. It is important to observe, that neither albumen, nor fibrine, nor fat, are ordinarily removed as such from the body by excretion. We might infer from this circumstance, that they are really the essential nutrients of the system, and yet we discover that these could not become nutrients except by the help of salts and inorganic compounds. The extent to which a very small amount of any salt or similar substance may act, is not easily estimated; but the importance of their service, both from their mechanical and chemical action in keeping up the proper distribution and relative affinities of the nutrient ingredients of the blood is very manifest. There is clear evidence that potash, and soda, and lime, combine with those acids which are produced by the changes going on in the organs, and that when thus combined, they are removed from the body. That saline matter,

principally consisting of soda, is essential to the blood, is proved by the circumstance that it is always found in it; and if this fluid be deprived of this salt, it becomes black, and cannot be rendered florid by the contact of oxygen; and therefore it is probable, that, without the presence of this salt the blood would be incapable of supporting life. The blood itself is alkaline from soda, and anything that diminishes its natural alkalescence hinders those chemical changes on which their health depends. The juices of the substances forming the organs are, with few exceptions, of an acid action, and the reciprocal attractions between their particles and those of the blood seem to be much influenced by their opposite conditions in this respect. The use of soda is palpable in the formation of bile, without which the bowels would be very imperfect in their action, nutrition defective, the lungs impeded, and the blood soon poisoned. Without soda, neither the bile nor the fluid from the salivary gland, nor that of the pancreas, would be capable of effecting those changes in the aliment which are essential to health, for without that alkali the chyle could not become the bland fluid it is required to be; but instead of sustaining the stream of life, it would bear the elements of destruction into the vital current.

The inscrutable character of the agencies engaged by the God of Providence in supporting even our earthly life, will appear, if we observe the extremely minute quantity of certain elements found in the blood. Their influence may be illustrated by the experiments on alloys made by Sir John Herschel, who found that a power not less than 50,000 times

greater than that of gravity, is constantly generated by galvanic influence, as, for example, in the alloy of mercury, with only a millionth part of its weight of sodium. When we consider that a power of the same kind, and acting in the same degree, is exerted in every chemical change effected between the blood and the invisible atoms of our bodies, we cannot but admire the delicacy and the might continually engaged in the elaboration of our physical being.

The particles of inorganic matter contained in the circulating blood are only mixed together, not combined, and, so far from being combined, they appear to be in a state of continual repulsion and opposition. Indeed, if this were not the case, they would probably soon be collected in crystalline masses, and thus frustrate all the purposes of life. It is, in fact, the heterogeneousness in the general mass of our circulating blood, that constitutes its fitness for maintaining all the vital processes. If the constituents of the blood and of the solids and fluids of our bodies were combined in definite proportions, like those of inanimate bodies, organic life would be impossible, but by this orderly and yet indefinite mixture of materials, all the chemical actions in the healthy body are made subservient to vitality. Thus, while life causes the attraction of appropriate particles together in the organization, exactly in the right place and proportion, it also prevents the ordinary chemical union of the elements in the blood, and thus in all the processes of life demonstrates the direct and incessant operation of a designing and intelligent Power.

## CHAPTER II.

### THE CIRCULATION OF THE BLOOD.

THE few facts already stated manifest—1st. The necessity of a mechanism by which the blood may be conveyed to all the organs, and

2ndly. An arrangement by which the quantity and quality of the blood may be duly preserved.

The first thing to be observed in relation to the circulation of the blood is that the blood is not a simple fluid like water, but that it consists of solid particles kept in a fluent state by the presence of just that proportion of liquid which shall best promote the rolling of one solid particle over another.

The blood in many living creatures is nearly without colour, and, in fact, the really liquid part of human blood is colourless; the minute bodies commonly called globules, which float in it, being invisible to the eye as distinct objects, cause this fluid to appear uniformly and intensely red. There are two kinds of globules in the blood—one red, or yellowish as seen singly, and the other white. During health, the coloured globules are fifty times more

numerous than the white, but these always increase in their proportion in debilitating disease, and I have seen them more numerous than the red. These white corpuscles are about  $\frac{1}{2500}$  of an inch in diameter, they are imperfect blood-corpuses, and are liable to considerable variation in size and form. The perfect blood-cell, globule, vesicle, or corpuscle, for they are known by all these names, is flat, like a piece of money, and about  $\frac{1}{3500}$  of an inch in diameter, and usually about  $\frac{1}{10000}$  in thickness, in the most healthy state of the body.

There can be no doubt that this remarkable physical constitution of the blood—minute, circular, compressible bodies, rolling in an albuminous fluid—is of great importance in mechanical as well as vital and chemical respects. It has been proved that water or any other simple fluid cannot be forced to pass through tubes so fine as the capillary vessels in the manner that blood passes through them, but by the addition of a few coloured globules of blood the liquid experimented on may be seen flowing on readily, under just that amount of propelling force which the contraction of the heart supplies. The red globules of the blood are but the  $\frac{1}{3500}$  of an inch in diameter, and yet many of the vessels are too fine to allow them to pass even one by one. Thus, the vessels in the transparent parts of the eye transmit no coloured blood while in health, but when inflamed they enlarge and admit the red blood.

Probably the globules influence the secretions through the glands, by their mechanical as well as their chemical constitution. It is well known that

the blood-cells vary in size and form in different animals, and that, as a general rule, the blood of one tribe would not circulate in the vessels of another, but that where the blood-cells are of similar form and dimensions, the chemical constitution of the blood is nearly the same, and the blood may be transfused without detriment to life. This fact seems to prove that the minute vessels of the secerning or secreting organs are formed in keeping with the kind of blood that circulates in them.

The globules are formed in the course of the circulation, and appear ordinarily to be most abundantly produced when the blood most abounds in albumen. When the blood is poor they are less numerous, and, in consequence of their absorbing water through their walls, when the blood is watery they swell into a more globular form, and become most disk-like or contracted and flattened under the opposite condition.

There are three stages in the development of the solid part of the blood. The colourless corpuscles or cells of the lymph or chyle are gradually converted into the red or perfect blood-cells during circulation. At first they are covered with bodies like tubercles and filled with granules. In the course of circulation they become smooth and their contents less distinctly granulated. When they arrive at this stage the colouring matter, *hæmatine*, begins to tinge the outer rind, so to say, just as the colour appears on the ripening orange. At last, all granular appearance vanishes, and the whole cell becomes deeper coloured, smooth, and uniform; but

instead of being globular it is now rather like a biconcave lens. This ripening of the blood is constantly going on with rapidity proportioned to the vigour of the heart, the suitability of the food, and the freedom with which the lungs act in pure air. From any vital disturbance, the blood degenerates and becomes blighted. The old blood-corpuscles liquefy and pass away; they do not form new ones, these are produced only from chyle and lymph. Thus, we see the necessity of a constant current of blood, and of a ceaseless supply of materials for forming it. If the new corpuscles in the blood were produced as the offspring, so to say, of the old ones, loss of blood would be far less readily reparable than it is: but food is the real origin of blood, and the process of renewal is always going on while digestion and circulation are maintained. The blood-cells are not directly converted into the substance of the body, but they convey oxygen from the lungs to all parts of the system, and return to the lungs laden with carbonic acid, there to be discharged in exchange for the vital air. Thus, it seems that the chief object to be attained by the circulation of the blood is to keep the red globules in incessant motion as the conveyors of oxygen between the air and every part of the body.

The reader is referred to books of anatomy for a description of the heart and its connexions, but yet it will be proper here to point out a few facts in relation to the mechanism of the circulation by way of showing its importance to health, and as affording a palpable demonstration of the might and tender-

ness of the Hand that formed us. The means by which the blood is kept alive and bearing life throughout the body, shows us plainly that the wisdom that devised the living structure must preside over its constant working, since a single interruption to the pulsation of the heart disturbs the whole system, soul and body, and the cessation of the heart's action for a few seconds produces unconsciousness and death. Every pulse operates on the whole frame. The mechanism proves the design ; but it is the commencement and maintenance of the motion which originates and preserves the mechanism itself that is the grand marvel in our contemplation of this subject ; for here we seem to have visibly before our eyes a manifestation of the Almighty's presence, since what we see is but His will in action. That alone is power, and that alone can cause motion whether among the orbs of heaven or the globules of our blood. Here in our own vital being, at our hearts and in our consciousness, we are in contact with Omnipotence, for nothing less is engaged in keeping us alive in every fibre, and capable of perception through every sense. The touch that first quickened and moved the heart continues to quicken and move it in every pulse.

Look at the heart in its living activity. Does it not behave as if it were conscious of its duty, and felt full of determination to perform it ? See how every part of the complicated organ consents to fulfil its office ; every minutia of the machinery cooperates ; all the fibres of the sensitive organism are alive to their business, one set relaxing in accommo-

dation to the contraction of another, and, yielding without being passive, they act only to the exact degree requisite for harmonious movement. The blood is the proper stimulus of the heart, and being ever present is always acting, but for the production of its full influence it is necessary that a certain quantity should be admitted successively into each of the chambers of the heart. How the motion began we know not, but the circulation being established, we see by what mechanism it is carried on. The bands of muscles forming the walls of the heart's chambers grasp the blood when a due quantity has arrived, and, contracting tightly upon it, press it forward in the right course. And thus the heart unweariedly persists in acting a hundred thousand times a day, it may be for more than a hundred years, and yet possibly ceasing within this hour.

The walls of the heart successively contract upon the blood just when a sufficient quantity has arrived, and then the blood which flowed in is pushed out again by a steady pressure on all sides, except just where it is to pass on. This pressure in the left ventricle, which propels the blood to the extreme parts of the body, is equal to about sixty pounds weight. We observe that the blood cannot return by the same avenue through which it entered, for by the act of contracting, the heart itself closes a door or valve in that direction, and therefore the blood rushes on through another avenue, the only way open for it, which on one side of the heart leads directly into the lungs, and on the other side to all the other parts of the body through appropriate living tubes.

When we consider that there are two distinct circuits to be established and maintained by the whole mass of the blood—one to the lungs, and the other to the rest of the body, including the substance of the heart itself, it is manifest that the blood must be flowing in four main currents, which of course require that the heart should be divided into four chambers, with appropriate valves opening and closing in opposite directions. There must be two chambers (auricles) to receive the blood on its return, thus acting as reservoirs, and two (ventricles) to contract upon it and force it again forward. One chamber could not answer the double purpose of a reservoir and a force-pump. A sufficient quantity of blood must be ready in the adjacent apartment, or auricle, at once and without delay to fill the contracting chamber when prepared to repeat its contraction, or instead of the regular and steady contraction and relaxation by which the currents of life are carried on there would be only a succession of spasms and jerks endangering the mechanism, and calculated only to produce pain and death. As one reservoir and one compressing chamber belong to the lungs, and another reservoir and compressing chamber to the larger circuit, the heart in effect seems to act as two hearts wrapped together. In some animals each side of the heart stands apart with a connecting pipe between them, instead of an aperture, as in man; but as the reciprocal and united action of all parts of the heart is essential to life, and as the current of blood must be unbroken, there is, in fact and working, but one heart and one circula-

tion, and a divided heart is only the strong metaphor by which we express the inconsistency of a perverse will.

This appropriate phrase, a divided heart, reminds us of the wonderful adjustments of unknown influence co-operating to regulate the circulation of the blood, so that the action of each part shall be *timed* to that of the other parts. The movement of one set of muscles, or the contraction of one chamber, does not positively determine that of another; for even when separated from each other and experimented on, they contract and dilate rhythmically; and yet, though formed to act with a certain independence of each other, their actions are so proportioned to each other in time and force, that instead of interfering, they mutually aid each other, except when disordered by some influence foreign to their proper organism. This marvellous punctuality in successive action affords us the highest possible idea of the wisdom that constructed this living apparatus. But why should we wonder? Man may imitate natural mechanism with some success; he may apply the powers which God has created, but yet in his noblest works he proves his inability as much as his genius. And it would be so with the highest angel; but the Almighty commands all means, all ideas, all ends, and thus every particular of creation partakes of the perfection of the whole, because it is the handiwork of Infinite Wisdom and Power. It would not be the touch of Deity if it did not as carefully regulate the movements of an insect's heart as those of the sun, moon, and stars.

The clearness with which Harvey announced (in 1628) his discovery of the circulation is beautiful—“I am persuaded,” he says, “it will be found that the motion of the heart is as follows:—First of all, the auricle contracts, and in course of its contraction throws the blood into the ventricle, which being filled, the heart raises itself straightway, makes all its fibres tense, contracts the ventricles, and performs a beat, by which it immediately sends the blood supplied to it by the auricle into the arteries; the right ventricle sending its charge into the lungs, the left ventricle sending its charge into the aorta, and through this, by the arteries, to the body at large. These two motions (one of the ventricles) take place consecutively, but in such a manner that there is a kind of harmony or rhythm preserved between them, the two concurring in such wise that but one motion is apparent.”\* The precision and completeness of this great man’s discovery are wonderful, but he studied with the patience of a Christian, expecting to see the perfection of God in his handiwork, and he took every opportunity of uttering his sense of the immediate operation of Deity, or, to use his own words, “God present, to point, as it were, with a finger to his existence in his works.” Well, therefore, did Cowley say—

“Thus Harvey sought for truth in Truth’s own book  
—Creation—which by God himself was writ;  
And wisely thought ’twas fit  
Not to read comments only upon it,  
But on th’ original itself to look.”

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\* Harvey’s Works, Sydenham Society’s Ed., p. 31.

To understand the adaptation of the heart to its functions we must minutely study the arrangement of its fibres, its muscular, tendinous, and membranous structures, its form, the mutual relations of its several parts, its own vessels, and those of the whole body in connexion with it, its power in respect to the resistance of all the arteries, the amazing form, arrangement, and action of its valves, and their silvery strong cords, each with its appropriate muscle, its lining, its covering, its nerves, its irritability, its life, and much more than can here be mentioned ; and all must be studied with reference to the philosophy of life, as involving that of mechanics and chemistry, or we shall have a very confused idea of that most wonderful thing viewed only as a piece of mechanism, a heart made of flesh. It is constructed with such skill only that a conscious soul may briefly feel the life of earth ? We who can sentimentalize on the heart, and reason on its wonders, habitually associate the idea of affection with its restless activity, but it is not in the nature of our hopes or our fears to imagine that our capacity of loving or of hating shall terminate with this heart's last pulse, and He who is the strength of our heart, tells us He is ours for ever.

We may in this place conveniently point out a few circumstances in the physiology of our subject which exert an influence on the heart's action, and may become the direct causes of disease. The pulse has been already alluded to, and shown to depend on the active contraction of the heart combined with the passive contraction or elasticity of

the arteries. The contraction of the heart being muscular and yet involuntary, must depend on some peculiarity in the nerves supplying that organ, for no part acts without nerves, and every kind of action is associated with some special arrangement of nerve-matter in connexion with the nervous centres, either in the brain, the spinal cord, or the ganglions of the great sympathetic nerve. On these centres, we need not enlarge; it is sufficient to observe that the heart has direct connexion with all these, and this may be proved without anatomical argument, for it is well known that whatever affects the brain, or the spinal cord, also immediately influences the action of the heart; and thought and emotion, which are demonstrated to act through the brain and spinal cord, are almost synonymous with the word "heart." The nerve that supplies the stomach, the lungs, and organs of voice with energy, also furnishes a branch to the heart, and the direct nervous connexion of the heart with all the involuntary organs is shown by the complexities of the sympathetic nerves by which it is supplied. We can therefore understand that the heart may be called into activity according to the demands of different parts of the system, and respond to the action of the lungs, the digestive apparatus, the passions, and the muscles. We can also perceive that it may readily be disordered by any influence capable of disturbing the system whether immediately or through the stomach and lungs, or through any means that affect the constitution of the blood. We do not wonder, therefore, at the palpitation of the heart in hysteria, its odd movements in

dyspepsia, its burning and bounding in rage, or its bursting in despair. It is made to sympathize with the whole system, mind and body, and to correspond with the demands of appetite and the expression of our feelings. The energy of the heart is diminished by whatever weakens the body, and the tone or the regularity of its action is influenced by any cause that alters either the quality or quantity of the blood.

Temperament influences the frequency of the pulse, and the female sex has usually a quicker pulse than the male. The heart acts much more frequently in childhood than in age. Before birth the heart beats about 150 times in a minute, just after birth 130, during the first year 120, in the third year 100, in the seventh 90, in the fifteenth 80, in middle age 70, in old age about 60. Whatever quickens the breathing also usually quickens the pulse, and *vice versa*. Posture affects the pulse; we maintain an upright position by muscular effort, and this effort is a demand upon the heart for the supply of energy; hence the pulse is slower when we recline, and also when we are weary or sleepy. The pulse is more frequent in an elevated situation than near the level of the sea. Variations in the pressure of the atmosphere influence the pulse irrespective of temperature, but heat and cold affect the actions of the heart in the most direct manner, both being stimulating, when acting in slight degrees, but when excessive, exhausting and depressing beyond almost any other agency.

The tone, or contractile power of the arteries, and

that of the heart, is vastly influenced by the state of the mind, the condition of the blood, the vigour of the brain, or, in short, by any action of the nerve-power on the muscular fibres existing in the walls or coats of those vessels. The pulse indicates the variations in their contractile power, and hence also intimate, to a learned touch, the degree in which the system is disturbed by any cause. The nerve-power, however, is not equal in all parts, like the impulse of the heart, and consequently we find that the arteries of a limb, or an organ, when diseased or excited, are altered in volume or size, though, of course, the force and number of the pulsations are the same in all parts of the body, as they always depend entirely on the contraction of the heart. By a wonderful adaptation, the main trunk of an artery will allow exactly as much blood to pass through it in a certain time as will the whole of the branches, however numerous, proceeding from it; and in a sound state of the arteries, the pressure of the arteries on the blood is always equable and steady, the strength of the vessel being always equal to its capacity, and to the degree of pressure upon it. Without this equality, the constant force exerted by the heart, together with the elasticity of the arteries, would cause the weaker part to become distended with blood until it burst, just as actually takes place in aneurism from lesion or weakening of the coats of an artery, in consequence of disease or violence, a result to be prevented only by diminishing the heart's contractile power, or by checking its force upon the weak part.

The anatomy and physiology of the heart, then, abundantly illustrate the law of health in the whole body, namely, orderly action, which depends on the maintenance of due power by a system of supply designed to keep the limbs and senses qualified for use by the mind. Steady activity in the right way is the doctrine of life, and the secret of health and happiness. Hence the forcible manner in which the Scriptures morally apply the natural facts concerning the heart's action and its importance in the economy: "Keep thy heart with all diligence, for out of it are the issues of life."

Physicians study the heart not only in its healthy mechanism and action, but also in disease, and they are much instructed by the sounds produced in its different parts by the passage of the blood through them, and that not only concerning the power and integrity of the organism, but also concerning the state of the blood itself, as well as in some respects the condition of the nervous system also. Accustoming the ear by the aid of the stethoscope (or chest inspector), to discriminate between the different sounds of the heart and lungs, they are enabled to detect, and rationally to treat, many maladies which would otherwise be beyond the reach of science. Here we see one proof among many, that, however easy it may be to act the physician, it requires a thorough and continued exercise of patient intelligence, and a refined use of the senses, to become one.

## CHAPTER III.

### CONDITIONS ESSENTIAL TO THE FORMATION OF HEALTHY BLOOD.

As the loss of health is but the breach of some law, on the operation of which bodily well-being depends, so also the cure of disease is not fortuitous, but proceeds according to certain laws, and is likely *ceteris paribus* to be best promoted by those who best understand those laws, and most patiently and conscientiously trace their connexions and operations. Remedies are man's, only so far as he employs the means indicated by God in the nature of things, and, in short, all the necessities of man require the exercise of his reason. As we are placed in relation to the elements, it should be our business wisely to accommodate ourselves, as far as possible, to the agencies by which we live, for our safety lies in the mean between the excessive and deficient influence of those agencies. We shall plainly see this truth if we attend to the conditions under which the blood is produced and kept in a healthy state. In the

first place, it is manifest that the materials of the blood must be derived from our food.

No function stands alone: food is converted into chyle, chyle into blood, blood into flesh, and in order to this the heart must propel, with just the right degree of force, a proper supply of blood to the stomach and intestines, and, indeed, to every part of the body; the nerves and all other essentials to the vital action of those parts engaged in the elaboration of chyle from the food, must coöperate; the milky chyle must be imbibed by cells, passed on to the lacteal vessels, and be conveyed into the blood as it returns to be ventilated and vitalized in the lungs. Thus, as already stated, many functions must be proceeding in unison for the perfect performance of each particular process, in order that life may be maintained as in an unbroken circle of action. All the minute vessels traversed by the chyle terminate in a tube called the thoracic duct, or duct pertaining to the chest, because it is first seen passing up through the chest, where the progress of the chyle seems to be aided by the act of breathing. The chyle, on passing from the lacteal vessels of the bowels into the thoracic duct, meets with a portion of the lymph, a clear fluid, which is returned by the absorbent vessels from the various organs of the body. This lymph, or watery liquid, bears dissolved in it those materials that have been used, and now require to undergo change in the lungs, liver, and elsewhere, in order to be rendered again serviceable to the system, or to be removed. The lymph is, in fact, a colourless kind of blood, and, being thinner

than the chyle, it serves to dilute that fluid. Still that the chyle requires to circulate for some time before it is thoroughly converted into blood, is proved by its presence being detected in the serum of the blood, especially in young persons. It is this that causes the milkiness of the serum, so frequently met with, and which physiologists were so long puzzled to account for until Mr. Gulliver pointed out the chyle-cells, as seen by the aid of the microscope.

The chyle being the essence of the food, and the basis of the blood, has to be conducted into the heart, and it is conveyed thither in a very circuitous way, for the important end of being converted into blood in the surest and quickest manner. The chyle is probably drawn into the blood by the heart's action; and that it may be most effectually within reach of the power of the heart, and, at the same time, most rapidly mingled with the blood, the great chyle-duct opens into the living current at the junction of the jugular with the sub-clavian vein on the left side of the neck. The mouth of the duct is here protected by valves, so that the blood cannot be forced into it, but the entrance of the chyle into the blood is expedited by every movement and every breath. Thus this important fluid commingles at once with two streams of blood, and is thoroughly and instantly blended with it in the intricacies of the right ventricle of the heart, and thrown thence directly into the lungs, where, by the repeated action of the air under the influence of life, the conversion of chyle into blood is gradually completed. Thus,

we see that the heart, nervous system, digestive organs, lacteal-vessels, blood-vessels and lungs, together with the vital powers within the body, and influences from without, must enter into mechanical, chemical, and living relation and coöperation, to render a particle of our food capable of administering to the general fund of life and strength.

A constant relation exists between breath, food, and action; and the blood is related to the air in digestion and muscular motion, as well as in breathing; oxygen being absorbed for the purpose of combining with the elements of the body to produce heat and muscular force, and to promote the removal of certain elements from the body in the form of new compounds, such as carbonic acid, water, urea, &c.

All the phenomena of human life in its physical condition may be referred to four heads—

1. The formation of blood from food.
2. The renewal or replacement of matter consumed in bodily function, and in thinking and willing.
3. The production of muscular power.
4. And that state of brain by which the soul is duly manifested in the body.

Disturbance in any of the processes by which these phenomena are maintained, is disease.

With regard to nutrition, and the formation of blood, it is most observable, as before stated, that all the food of animals is organized, that is to say, it has already lived, either as parts or productions of some animal or vegetable. Vegetables possess the power of directly converting certain inorganic mat-

ters into their own substance, but this is a faculty not belonging to animals. Observe, again, the force of those words in Gen. i. 30. *To everything wherein is life I have given every green herb for meat.* The light of modern chemistry enables us to discover the extent to which this language may be applied, and proves to us that vegetable existence is the *only* real source of nourishment to creatures having life in the Scriptural sense. The idea contained in the above passage clearly appertains to a knowledge beyond the common-sense apprehension, for every one knows that plants are not the immediate food of all animals. The words, therefore, contain a truth out of ordinary reach, and which has not been fully discovered until these times; but the Author of all science is now wonderfully opening the understandings of men, as if to invite their fuller and thorough attention to those grand spiritual realities to which all natural truth for ever points.

Physiologists have too much overlooked one striking peculiarity already alluded to, as characterizing substances capable of furnishing the elements of the blood. Every substance containing nitrogen in such combination as renders it suitable to be admitted into the circulation, as a nutrient of the organs, has a tendency, when slowly separated from solution, to form globules very like those of the blood. Having satisfied myself of this truth by many experiments, I think we may discover in it a law having reference to the requirements of the blood as a circulating fluid, in which, if the elements were to unite to form solids in any but a minutely

globular form, the due distribution of the blood through the extreme vessels, some of them finer than a spider's thread, would be impossible.

We must bear in mind that every organ of the body contains in various proportions the same elements as fibrine, albumen, and caseine. These substances wherever found are stated to be essentially the same in composition, and differ only in integral arrangement and their respective proportion of salts. The purest specimens of these substances are the fibre of flesh or blood (fibrine), the white of egg (albumen), the cheese of milk (caseine). With the addition of water, and under the influence of life, these substances may all be quite converted into blood and flesh. They all contain nitrogen, hydrogen, oxygen, and carbon, combined with phosphorus, sulphur, salts, &c. No organ of the body contains less than 17 per cent. of nitrogen, which is exactly the proportion of this element in the fibrine of the blood.

Every organ, and every component part of an organ, demand their own especial food, for every peculiarity of structure is accompanied by a peculiar modification of the essential elements which enter into its formation for specific purposes in relation to life; thus the chemical composition of the liver differs from that of the kidneys, and so forth. It is therefore important that the choice of our food, as well as the amount of our exertions, should be made according to the demands of the different organs of the body, according to their state at any time, and also according to the general state of the whole

with regard to habit, or temperament. The food that suits a nervous man rarely agrees with the sanguine, and a person of bilious habit or irascible temper may be almost poisoned by a diet that would but improve and invigorate a lax and lymphatic body.

Water, fat, and the inorganic substances, or salts, are the only ingredients in the body that do not contain nitrogen. Nitrogen is, in short, essential to our organization, but the muscles require most of it, and it is evident that no substance can be fit for food if destitute of the elements of muscular substance, since without muscles we could not move. The substances of our muscles, and the tissue of all other organs, are primarily obtained from those vegetables which separate from the air and the soil that very element which the animal body most requires for its organization. Four-fifths of the atmosphere consist of nitrogen, but it does not appear that we have the power of withdrawing any of this by breathing, so that it shall become a part of our substance. It is the oxygen only that chemically acts on our blood in respiration. Thus we see that we are really kept alive by the air in two ways—one through the direct process in breathing, by which the oxygen acts on all the body, and another indirectly through the nitrogen which is withdrawn from the atmosphere by vegetables to form our food. Thus our bodies are formed out of the earth and the air, and kept alive by a power that subdues all the forces of the elements for awhile to our use, so that they shall minister to the production and support of each individual body.

in a fixed manner, and then, by some alteration in the balance of forces, be the means of again resolving that body into dead matter.

But what are the purposes of the inorganic earths and salts, and what is the use of fat and such substances as do not contain nitrogen? They are necessary for the maintenance of warmth and for the promotion of those changes effected by respiration, without which our bodies might as well be crystals, for they would be equally without intimate and successive alteration, and every part of the body would become a dead fixture. But active life and rapid change of substance, the continual act of decomposition and recombination, or the incessant production of our bodies out of the elements, and their return to these elements, are the coincident and essential conditions of our earthly existence.

Saline substances and alkalies are requisite for the solution of the albuminous compounds in the blood, and without salts dissolved in the circulating fluid, the air admitted into the lungs would cease to effect the important changes there carried on. And with regard to substances not containing nitrogen, it must be observed, that if there were no substances in the body containing more carbon and hydrogen than the muscles, the act of breathing would soon destroy us. The excess of oxygen conveyed from the lungs in the arterial blood to the remotest and minutest parts of the body unites with the excess of hydrogen and carbon it may meet with, producing water and carbonic acid, and in the act of combining giving out heat, so as to cause the equable and con-

stant diffusion of that genial warmth so essential to all the offices of life. The fat is deposited in the interstices of many parts of the body, but only where it may in moderate quantity be stored with advantage rather than impediment to the movements of the organs,—it is never deposited in the eyelids, for instance.

As the coal, though contributing nothing to the structure of the steam-engine, is essential to its action, by causing heat that converts the water into steam, and thus produces force, so the hydrogen and carbon contained in fat, sugar, and such substances, are essential to the warmth and activity of the body, by promoting the process of breathing and the separation of oxygen from the air received into the lungs. The carbonic acid produced by the union of the oxygen withdrawn from the air, with the excess of carbon met with in the blood, must be carried off by the lungs and the skin, or otherwise in combination with some alkali in the bile or the urine. And thus also the water and the warmth produced by the combination of oxygen with hydrogen must be conveyed off from the body as fast as it is produced, or dropsy and fever would be the immediate and constant results. We see that water is exhaled from the lungs and the skin, as well as secreted from the kidneys, and carbonic acid is always passing with the perspiration on the surface, on which the cooling process is constantly proceeding, so as to preserve the body very nearly at the same temperature, about 98°: except when assailed by fever, when it may rise ten degrees higher. That carbonic acid,

the poisonous air known by miners as choke-damp, is exhaled with our breath, may be proved by breathing through a tube into lime-water; the carbonic acid expired from our lungs combining with the dissolved lime, causes it to precipitate or fall down in a milky form, from the fine insoluble particles of chalk, carbonate of lime, thus produced.

Observe, again, that the functions of life have no creative power, they cannot produce a single element for their own support, and everything necessary for life must be conveyed to the blood in our food. Hence the propriety of studying those providential arrangements on the knowledge of which the proper choice and production of food depend. The wants of the creature are the care of God, but man is endowed with reason that he may behave rationally, or in agreement with Divine method; therefore the employment of intelligence is at all times necessary to human prosperity, and it is for lack of knowledge that the people perish. As to hinder the distribution of food is to oppose the liberality of the Giver and God of life, so to impede the diffusion of truth is to promote those errors which cause the destruction or discomfit alike of soul and body.

Milk is the only natural product simply and perfectly adapted for food in all its direct requirements. If we study the chemical constitution of this beautiful provision, as adapted to the wants of the young animal just fresh from its Maker's hand, we shall see much to give us confidence in the charity of our Creator, and at the same time learn the true nature and use of food. Milk contains caseine, or curd, fat

(butter), sugar, phosphate of lime, other salts, and a trace of iron, with a large proportion of pure water. Milk, in fact, is as complete a supply for the nourishment of the new-born mammal as the yolk and white of the egg is for the embryo of the oviparous animal, which contain nothing but what is actually subservient to the formation of the growing body, for out of the egg, with the aid of air and warmth, the chick is formed, and with their mother's milk alone young animals grow and thrive.

Not a single ingredient of healthy milk can be dispensed with. 1st. There is caseine, or curd, which is similar in elementary composition to white of egg and animal fibre, only containing a larger proportion of phosphate of lime or bone-earth. Caseine is capable of entire digestion and conversion into blood. It contains the elements of all the organs, and is, in fact, the substance out of which they are all formed. 2ndly. There are in milk also sugar and butter, though it might appear as if caseine, or curd, with the requisite quantity of pure water, contained all that is essential to the vital functions. Now, sugar is carbon united with water; and butter is hydrogen united with carbon. These elements, thus combined, are not needed to form the substance of the organs, but yet they are of vast importance in keeping up the action of the organs. The generation of heat, as just now stated, is mainly due to the current and interchange of the elements in the blood, which are carried on under the influence of the nerves, by the act of breathing, as on this act the circulation, and thence every func-

tion of life depend. By breathing, the superabundance of carbon and hydrogen in the blood is brought into contact with the oxygen derived from the air, and thus, as we have said, the hydrogen and carbon are consumed. The blood by this means obtains a continual accession of warmth, as if by a species of slow and diffused combustion, a real vital flame, a living fire. The excess of carbon and hydrogen necessary for the production of fat in the body, and for keeping up the heat of the blood, is thus, we perceive, wisely and benevolently supplied through the sugar and butter in the milk on which the young animal feeds, while the iron, phosphate of lime, and protein-substance essential to the formation of blood and the bones and tissues are furnished in the solution of caseine.

It is evident that if the mother's milk be deficient in any of its proper ingredients (a state resulting from ignorant mismanagement which we often find in practice) the infant's body must be proportionally impaired, and as it abounds with fluid, and all its changes are rapid, its demand for nourishment is proportionally great and frequent. Without caseine, or some kindred substance, the child cannot grow; without butter, and sugar, and water, it will breathe only to consume away, and become colder and colder until it dies.

The best food is that which contains the elements of milk; but no other single substance does contain them. The proper variety of nutritious elements are best obtained by the combination of oily, sweet, farinaceous, and animal substances in

our diet; in fact, just such a mixture as the instinct and rational discernment of man generally led him to adopt even before science came to his aid.

How surpassing is the bounty of God! His providence meets the wants of all his creatures: the requisite variety of sustenance is alike produced by successive seasons, diversities of soil, and variations of climate. This earth is intended for interchange and commerce. The food deficient in one part of the world is abundant in another; but when all the products of the globe are gathered together, the best art of the cook is still exercised only in concocting that which shall be ultimately, in the union of its elements, an imitation of milk, or it cannot be truly food.

The adult stomach, when accustomed to milk, and when not excited by artificial stimulants, will digest it well; but a more solid diet is more suitable for a grown person, since digestion is designed to proceed more slowly in the mature state than in infancy; for in the grown man all the functions proceed as if with a view to the steady exercise of attention, and of power in action, rather than to the development of the organs. It is a well known fact that a liquid and nutritious diet favours rapid growth and the fattening process, but a more gradual production of blood, just in proportion to the waste resulting from the use of the muscles, is best calculated to promote bodily and mental firmness, vigour, and capacity of endurance. Hence, those who train themselves for great exertion take little drink and eat animal fibre in proportion to their exercise. Here we observe

another instance of the aptness of the metaphors in the Bible: the inspired fisherman distinguishes between the benefits of strong meat and those of milk, and says, "Desire the sincere milk of the word that ye may *grow* thereby." He certainly quite understood the philosophy of his subject, as we shall find if we follow his advice.

## CHAPTER IV.

### THE RELATION BETWEEN DIGESTION, THE CIRCULATION OF THE BLOOD, RESPIRATION, AND ACTION.

THE process by which food is converted into blood begins in the stomach, or rather in the mouth, as the food is there blended with the saliva. Sulphur, cyanogen, (bicarburet of nitrogen,) and potassium exist in combination in the saliva; their action in digestion is not understood, but it is manifest that their presence is of importance, since they are found in the blood and in the substance of the flesh. Digestion is a process of transformation proceeding on purely chemical principles, the elementary particles of the food being separated by a solvent, and then again grouped together in such a manner as to be brought within the influence of new affinities as they operate in the living body. Man's food is always an organized substance, and it has to be disorganized before it can be re-organized. Cooking is the commencement of this disorganizing process, and mastication the next step, but it is completed by

the acid formed and poured out from the inner coat of the stomach.

All our great chemists allow that some acid is essential to digestion, but they do not agree as to its nature, some saying it is acetic, some lactic, some hydrochloric, some phosphoric. The best authorities, however, give their testimony in favour of hydrochloric acid, as the chief and essential acid in the process, this being always present in the gastric juice.

This hydrochloric acid, together with a certain principle, *pepsine*, blends with the food in the stomach; but the acid is neutralized and overcome in the intestines by the bile and other alkaline secretions, such as that from the pancreas, which there come in contact with the chyme, or dissolved food. It appears from experiment, that *pepsine* is the chief solvent engaged in digestion, one part of this principle, dissolved in 60,000 times its quantity of water, being sufficient to digest meat and many other substances. The existence of pepsine as a distinct principle is, however, still disputed; and according to Liebig's view of the subject, digestion is the action of an organic compound in a state of transformation, just as a substance in the act of dissolving assists the solution of other matter of a similar kind. In short, he considers digestion to be a commencing putrefaction, arrested by the acid of the stomach exactly at that point at which the atoms of the dissolved food acquire the power of being grouped together in a new order.

The fluid secreted by the pancreas is poured into

the bowel next to the stomach, named duodenum; there it mixes with the bile, and it appears, from recent observation, that the pancreatic fluid is especially required for the digestion of starchy substances, and of fat. If we mix starch with water at about the temperature of the human body, and add a few drops of the pancreatic fluid, the grains of starch that gave opacity to the mixture are speedily dissolved into a clear solution, and the starch losing all its characteristics, is converted either into sugar or *dextrine*, the latter being a modification of gum and sugar, familiarly known as British gum. The pancreas seems to secrete a principle akin to that generated in the seeds of plants in the process of germination, and which is also supposed to be produced in the saliva, since this fluid acts on starch in a similar manner. It is concluded by some physiologists, that the digestion of starch depends on the presence of the transforming or separating principle known by the name of diastase, (*διάστασις*, separation,) which, with the aid of a certain degree of warmth and moisture, converts the starch of seeds and buds into gum and sugar. But the existence of this substance as a distinct principle is rather doubtful, and it seems more reasonable to regard it as a substance *in transitu*, or partially decomposed; and it is well known that the mucus of the intestines and various other substances, such as membrane, when undergoing change produce the same effect on starch. It is unquestionable, however, that the pancreatic juice and saliva aid the digestion of starch, but they must serve some other purpose, or the

*carnivora*, that naturally swallow nothing farinaceous, might dispense with their large pancreatic and salivary glands. That the pancreatic fluid exerts some influence upon the digestion of fat is probable, since it has been found, that in disease of the pancreas fat is not readily absorbed; indeed, M. C. Bernard, in a paper read at the Institute of Paris, in 1848, showed that a mixture of bile and pancreatic juice, such as is found in the duodenum, has the double power of dissolving the neutral fats and the fatty acids, and that if the pancreatic ducts be tied no fatty matters find their way into the chyle-vessels.

From the united operation of many chemical and vital productions and affinities, the elements fitted to form chyle are rendered capable of being separated from the digested mass, and they are removed from it by a kind of attraction between them and the coats of the bowels. The chyle, however, is not received from the lining of the intestines through open orifices into the absorbent or lacteal vessels; but these vessels terminate in fine loops, in the midst of a mass of cells formed for the purpose of acting exactly the reverse of those cells engaged in secretion. These absorb the minutely divided substances presented to them in the digested food, and convey such as are fit to form chyle into the absorbent vessels, which in their turn pass it on to the thoracic duct. The chyle undergoes some change in its progress through its vessels and the glands of the mesentery, by which it becomes chemically more like the blood. Those substances that are held in perfect solution, appear to be admitted at once into the veins of the bowels

through their lining membrane, the extent of which is vastly increased by innumerable folds, thus facilitating the admittance of the aliment into the system, while affording also a larger secreting surface for the production of fluids that assist in digestion and promote the passage of the alimentary and excrementitious substances.

We now recur to the circulation of the blood, in order more clearly to point out a few other facts connected with the demands and supply of the body. The blood flowing to any part for its nourishment is called arterial, because it is conveyed in arteries; the blood returning from the organs is called venous, because it is conveyed in veins. The colour of arterial blood is bright scarlet, that of venous blood is brownish purple. The body is kept alive and nourished only by scarlet blood. The arteries pulsate in keeping with the contraction of the heart, their coats are strong and elastic, they slightly contract and elongate as the blood is pressed into them, and thus they assist to propel it forward into the weaker and less contractile veins. The extremities of the arteries are, however, not continued into the veins, but lost in a multitude of fine intermediate channels, so that we cannot always say where the arteries terminate, and where the veins commence. The scarlet blood gradually loses its brightness as it yields its nutrient elements to the parts which it permeates, and it is thus slowly changed during its course into venous blood by yielding up its oxygenized elements, and by receiving the deoxidized materials of the body. Thus the current, as it

approaches the veins, becomes dark, and abounds in combinations of carbon and other substances which are not fit to nourish the organs, but must be removed from the blood.

The importance of the *liver* and *kidneys* in relation to the circulation will appear, when we reflect on the fact that the urine and the bile together contain all the elements of the blood. The bile in health is almost entirely returned to the blood, and its value in subsidiary relation to the lungs is shown, from its presenting carbon and hydrogen in a very soluble form, which is readily reabsorbed into the system, and quickly combines with the oxygen of the arterial blood. The urine, however, contains only such substances as are incapable of further use in the system; in short, the fully oxidized materials which must be removed from the body, or cause disease. Hence we see how changes in the state of the bile and the urine may accompany all disorders of function, and how their states may assist a wise practitioner to determine on the kind of remedies to be employed, and to judge of the probable success which may attend their use. A redundancy of bile indicates the propriety of diminishing the food, taking less salt, and avoiding sweet, oily, and stimulating substances, while using more exercise and tranquillizing the mind. A highly-coloured urine, especially with a reddish sediment, indicates as a general rule the propriety of taking more water, withholding animal and lessening all solid food, at the same time taking care to preserve the skin from cold, as in this state the mucous lining of the stomach

and lungs is apt to suffer from chill, and inflammatory action is readily induced, if not already existing.

*Venous blood* is as necessary to life as arterial. Though any part of the frame would die instantly if supplied with venous blood alone, yet the life of the body is supported by the share which it takes in the economy of nutrition; from it the bile is prepared, and the materials furnished for completing digestion, and for keeping up the warmth of the system. Thus the elements of death administer to life, and within our bodies, as throughout nature, destruction and decay become under Divine Wisdom the means of perpetuating the activities of sentient existence.

The lungs are so adapted to the heart and its action, as in health to receive and return the whole mass of blood in the space of about one hundred and sixty seconds; and they are so constructed that every particle of blood is brought under the influence of the air, and nearly into contact with it, through the extremely delicate and numerous vessels which surround the air-cells, which are distended with air by the act of breathing. In every full breath a pint of fresh air is diffused over about fifteen square feet of the mucous surface of the air-tubes and air-cells. This occurs once every three or four seconds, and of course a like quantity of impure air is exhaled as often. In the space of twenty-four hours, about twenty-four hogsheads of venous blood, and fifty-seven hogsheads of air, act upon each other in the lungs. Arterial blood is converted into venous in the general capillaries, but venous blood is converted into arterial in those of the lungs.

The pulse, the breathing, and the general temperature of the body bear a pretty constant proportion to each other. A healthy man with a pulse at seventy-two, while tranquil breathes about twenty times in a minute, and the temperature of his body is about ninety-eight degrees.

The blood, as it is returned from the general system, is successively received by the right ventricle of the heart, and by its contraction is propelled through two arteries into the lungs. One circumstance in the structural connexion between the heart and the lungs remarkably evinces the wisdom by which the breath and life are united. All the various sets of valves in the heart close perfectly, with one exception, and that exception takes place only on particular occasions. The closure of the *tricuspid* valve, between the right auricle and ventricle, is not complete if the lungs be already full of blood, when the right ventricle, which forces the blood into the lungs, contracts, but the effect of the contraction in that case is to open the valve, and to allow a regurgitation of the blood until the lungs are ready to receive a further supply. The circumstances in which this "*safety-valve action*" is called into exercise, occur only when there is considerable disease of the lungs, or in extreme exertion, as when a man runs for his life, so that exceptional provision is made in anticipation of exceptional occasions.

The only instance in the body of arteries conveying venous blood and veins arterial, occurs in the circulation belonging to the lungs. The dark blood passes into the lungs through the pulmonary arteries;

and this blood becomes vitalized and of a scarlet colour by the action of the air in the delicate vessels of the lungs, and thus it enters the chief veins of those organs as the most highly arterialized and warmest blood in the body. It is conveyed through the main trunks of these veins, first into the left auricle, and then into the left ventricle of the heart, to be thence distributed, charged with new life to the whole system. Thus the Almighty in our bodies, as in all the universe, has instituted exceptions to general rules, only to prove more clearly to finite minds the wisdom of those ordinances by which He adjusts all things to his own benevolent ends.

The vital air is carried by the blood to every part of the body, and by the absorption and distribution of the excess of oxygen in the arterial blood, every atom of the system is successively acted on, and becomes oxidized, in which state it is in its turn removed by excretion, its oxidation having contributed to produce warmth, and also to maintain the function of the organ to which it belonged. Thus, whether at the pole, or at the equator, man's blood, while in health, is preserved just at the same temperature, 98°, in consequence of the equilibrium maintained by Providence between the quantity of air breathed, and the state of the blood on which it acts. Young children and aged persons, however, produce less heat than those in the more active periods of life, and in both extremes of life the organs of respiration readily become diseased by a temperature which would be quite agreeable and salutary to those

in middle age. The very young bear cold better than the very old, because they have warmer blood (106), and are excited by cold to muscular action, as in crying, which expands the lungs, and admits more oxygen; but in extreme age, the effect is simply depressing; hence so many old persons are found dead in their beds during the winter, especially in workhouses, where the temperature and general treatment are adapted to suit the majority, without sufficient regard to particular cases. Childhood and age alike find all extremes either of temperature or diet dangerous to life; and regularity and flannel, as John Hunter said, are to them as necessary as proper food.

The connexion between the breathing, the blood, and moving power, has often been illustrated by a comparison drawn between the living body and a steam engine, a comparison which will also elucidate the doctrine of disease. The object in both the body and the engine is to produce a uniform motion. As in the engine the stop-cock is so contrived and connected as to allow more steam to be admitted when more force is demanded, so when the temperature of the body is diminished, the respiration becomes deeper. In the body, the state of the circulation, and the quantity of oxygen inspired, determine the consumption of the materials of the body; and in the steam-engine, the expenditure of steam and fuel is proportioned by the demand for motive-power, or heat, which demand is regulated by the opening or closing of the valve according to the rapidity of the movement. Thus, also, the power and temperature

of the body are maintained with regularity by the change of matter under the influence of breathing. The respiration may be compared to the fire that consumes the coal, and gives force to the steam; and the materials derived from the food we may compare to the coals, by which the heat and force are kept up.

The body is preserved in health by being gradually consumed, and at the same time renewed. It is consumed by breathing, and by the excretions; it is renewed by the conversion of food into blood, and of blood into its own substance. The consumption of the body is rapid in proportion to the consumption of air in breathing; therefore, the man whose breathing power is highest, other things being equal, requires most food. The breathing power is increased by exercise, being thereby deepened as well as expedited. Thus, also, the changes of the blood are quickened, as we find from the circumstance, that, by exertion, the pulse is augmented both in force and frequency, and the whole body becomes more heated, at least on the surface. The changes of the blood, and of the substance of the body, being rapid in proportion to the production of heat by action and breathing; and as this results from a consumption of materials, and is greatest in the coldest atmosphere, it follows that, in order to be healthy and comfortable, we need more food and exercise in cold air than in warm. Liebig says, "Our clothing is merely an equivalent for a certain amount of food. If we went fishing and hunting, exposed to the same degree of cold as the Samoyedes, we should be able

with ease to consume ten pounds of flesh, and wash it down with a quart of train-oil, because the carbon and hydrogen of these would only suffice to keep up the proper temperature of our bodies." This is illustrated by the experience of Sir John Franklin's party in their polar expedition. During the whole of their march, they found that no quantity of clothing could keep them warm while they fasted, but plentiful cheer gave them such power of resisting cold, that they could scarcely believe otherwise than that the season had become milder, whenever they made a full meal. Here we may remark, that the habit of exposure to the cold also produces a power of resisting it by enabling the system to generate heat more rapidly, and by altering the condition of the skin as a conductor.

We learn many important practical truths from these facts: we see that to consume the same quantity of food in warm air as in cold, is to lay up a store of disease; and we perceive that change of air must be advantageous according to bodily condition. Venous fulness and grossness of habit generally demand a change from a low damp or warm situation to one more elevated, cool, and dry; but impaired digestion or deficiency of nerve-power, with wasting of the muscles, requires not only a proportioned and appropriate diet, as well as a tranquil mind, but also a mild climate, that the amount of oxygen respired may be in keeping with the diminished respiration and assimilation. Where disease of the lungs curtails the power of absorbing oxygen, a rather dry air at about  $60^{\circ}$  is best, a very warm air being too rare-

fied. In scrofula, tubercle, and kindred diseases, the same observation holds good. It is a well known fact that oil, cod-liver oil for instance, is highly advantageous in such cases, provided the lungs are sufficiently sound to absorb a due quantity of oxygen to consume the carbon and hydrogen thus furnished to the system, otherwise the oil, while checking consumption, still only adds a new clog to the machinery of life.

Dr. Prout has pointed out the interesting fact, that the quantity of carbonic acid produced by breathing varies considerably, being least about midnight, and most about noon ; gradually diminishing until nine P.M., and continuing to diminish until three in the morning. The quantity produced is doubtless influenced by exercise and diet as well as by the state of health. The experiments of Andral and Gavarret, prove that the amount varies at different ages, being also much dependent on the degree of muscular development. Thus, a muscular man, at 60 years of age, expired 209 grains of carbon in an hour, while a very old man expired only 90 grains. The amount increases with age up to 45, and then diminishes. The adult male of moderate constitution exhales from 160 to 170 grains of carbon per hour, and the adult female from 100 to 110 ; the quantity being of course increased during pregnancy from the demands of the foetal system. Hunger and rest diminish the quantity, but satiety and exercise increase it. When the body exhales the least carbon, it is most liable to take disease, as immediately after

great exertion, fasting, and fatigue; thus, after the excitement of the system by warmth or stimulants has subsided, colds, congestions, and inflammations, are apt to occur on exposure to change of temperature.

All the organs of the body which are destined to effect the rapid change of the materials brought in contact with them, such as the lungs, are full of fine arterial vessels. If, therefore, they were not endowed with a remarkable power of resisting the action of the oxygen upon them by their self-regenerating activity, they would speedily be dissolved by their own blood. This resistance in the muscles is so great while they are furnished with plenty of good blood, as completely to neutralize the action of the oxygen upon them. It follows, however, from the constitution of the body and blood in relation to the action of oxygen, that if the blood be not furnished sufficiently with the materials of muscle, membrane, &c., the oxygen in the blood will rapidly destroy the substance of the muscles and vessels, or so weaken them as to render them especially liable to disease. Those surfaces and tissues which are most exposed to the action of oxygen are, therefore, most liable to disorder from deficiency of diet and proper warmth. Hence, the glands and the lungs are most subject to tubercle and other forms of disorganization, and hence chilliness, hurried circulation, unhealthy complexion, loss of hair, and eruptive disease, are apt to accompany that condition of blood which favours disease of the stomach, bowels,

liver, and lungs, and predisposes to the catarrhal or cold-catching habit, as also to consumption and scrofula.

Here a word to hydropathists may not be out of place, if they will but accept it as kindly as it is offered. A large appetite, a good digestion, Priessnitz's greasy diet, and free exercise in pure air, are necessary to render the cold water treatment quite safe; and many delicate persons have died under it from inattention to the *rationale* of the system, and from want of power to digest fat and to exert themselves sufficiently. Large quantities of cold water act on the body by rapidly withdrawing its heat, and by hastening the decomposition of the tissues under the action of oxygen. If the cold water, therefore, produce corresponding appetite, and digestion, and ability to walk, the *crisis* may be borne, and new health *may* follow it. We must, however, remember that the *crisis* is but the commencing death of the cellular tissue; and if on its appearance the destructive process be not soon stopped or greatly modified, by change of diet or diminution of the water, the death of the whole body soon follows. Where the muscular power or the nervous system is much weakened, or the lungs inefficient, hydropathy or any other exclusive treatment that either quickens or retards the vital functions is dangerous. Cold water has been known as a powerful remedy from the earliest records of medical experience, but, like all other powerful remedies, it has been extravagantly lauded, then abused, and then neglected. But true science is superior to the fashion of popular impulses,

and holds consistently in view the causes, means, and ends of organism, whether in health or disease, and adapts the remedy to the particular case.

How is muscular power maintained? For an explanation of the mechanism of the apparatus of motion, works on anatomy and the dissecting room must be resorted to; but we may understand without them that the machinery of motion must be caused to move by some force that is not mechanical. We ought to distinguish between a movement and an act. An act implies a will in immediate operation; as, when my hand is moved by my volition to take hold of anything; I am the active agent, but the movement is effected through a mechanism and a power instrumental to the will. What is this power resident in the mechanism? We know no more of that than we do of gravitation. It is as easy to account for the hanging of the worlds upon nothing as to account for the twinkling of an eye or any motion. In short, the words *power*, *force*, *law*, and *action*, refer us directly to the will of God, as expressed in those arrangements of existence by which things influence each other according to their nature. The agency which actuates the body is unknown, but its mode of operation may be elucidated by the analogous action of galvanism. Galvanic force is never manifested but when either chemical or mechanical change takes place, as by friction, pressure, or decomposition. By either of these means, under suitable arrangements, an electrical current of action may be established; and every act of mind also evolves electricity from the brain and nerves. Here

are facts; but who can explain them to our satisfaction? The highest philosopher can teach us but little even concerning the conditions necessary for the effect in any case, much less of the connexion of cause and effect. We see, for instance, that the chemical action between the acid and the metal in a galvanic trough produces the manifestation of another force, which operates on the electric wire, and puts the machinery of the electric clock in motion by modifying magnetism; but how or why we know not. Here are several influences at work together to one end, motion. So it is in our bodies: life is preserved by several reciprocal actions, and the same power that manifests life seems also to produce motion. The nerves are the conductors of the force that excites muscular motion. We have here, however, but a slight analogy to the conducting wire, since in exciting voluntary motion it is *the will* that acts upon the nerve, and not a physical agency. Still the power of maintaining this motion in the animal economy is proportioned to the rapidity with which the muscular fibre may be transformed or decomposed by the action of oxygen upon it, that is to say, in proportion to the supply of arterial blood. The greater the muscular action, the more rapid the change or waste of substance, and the more urgent the demand for vital aliment, or good food and good blood.

Liebig has especially directed attention to the connexion between muscular power, warmth, and the oxidation of the blood; but whether he has done justice to former physicians is doubtful. Dr. Beddoes,

Dr. Girtanner, and others, proved more than fifty years ago that irritability, muscular motion, and animal heat, depended on the supply of oxygen, and pointed out very clearly how substances that hindered the action of oxygen on the body operated as poisons. Dr. Girtanner, in his Treatise on Irritability, (quoted by Dr. Beddoes,) states that he concludes from his experiments—

1. That respiration is analogous to the combustion and oxidation of metals.
2. That during circulation the blood loses its oxygen and becomes charged with carbonic air and hydrogen.
3. That during the distribution of oxygen through the system, heat is evolved through the union of the oxygen with other elements.
4. That the great capacity of arterial blood for heat is owing to the oxygen with which it is united in the lungs.

These conclusions are sufficiently like those of recent discoverers to indicate that men and the honours due to them are soon forgotten.

The provision made in the constitution of a muscle, for its growth and development by exercise, is very remarkable. The parallel threads of which a muscle is composed, instead of fraying and breaking by wear, like the cordage of a machine, are not only individually strengthened by use, but are also increased in number; for, in proportion to the demand upon the blood, the materials of the muscle

are supplied, provided, of course, that exertion be kept within due bounds, as moderation is the principle on which the whole system is constructed.

“Toil and be strong.” If we would see the advantage of exercise, we have only to observe how it helps to propel the blood along the veins. A hand that looks bloodless and shrivelled when cold and inactive, becomes warm and distended with blood by a few rapid movements of the arm; and a chilly body that in vain seeks comfort by the winter’s fire, quickly glows with renewed warmth and animation by a run in the fresh air. Compare the muscles and bones of those who have been brought up inactively with those of the laborious, and you need not ask for other evidence in proof of the benefits resulting to the whole framework by a moderate degree of habitual exertion. The power of endurance is in all respects improved by that amount of exercise which favours a moderate development of muscular power; but we find that men trained with a view to any special exertion, as that of pugilists and runners, though they may be extremely well fitted for the object in view—a great effort for a certain time—they are obliged to be peculiarly careful to avoid exposure to cold and damp, since it is found that such training rather over-excites the arterial system, and predisposes to inflammatory disease as well as irritability of temper. We best preserve the body in good working order by habitual exercise of a moderate, steady, and regular kind, and by that kind of employment which requires no forcing either in diet or in muscular efforts.

The importance of the connexion between the blood and the air, cannot be better shown than in the fact, that the amount of muscular power is exactly proportioned to the quantity of living substance transformed in a given time under the influence of the oxygen absorbed from the atmosphere. This oxygen, as already said, is conveyed to the muscle by the blood, and enters into combination with the elements of the muscle, and, in the act of oxidizing its substance gives out, so to say, at the instant the vital force by which the muscle acts under the influence of the will and nerve. It is a beautiful fact, that the arterial blood has not the slightest effect on the substance of the organized parts, unless the vital force of those parts be used. We live and move because we breathe, for the air we breathe confers the force with which we act, the will exciting the muscle, and enabling it to obtain from the arterial blood the oxygen which consumes its substance, at the same time that a renewal of that substance is thus promoted. While the change is being effected, a force analogous to the magnetic is produced, by which the power of the muscular contraction is determined, and a demand for more blood excited. Hence, without exercise our muscles become slight and feeble, and the whole system is weakened. There is nothing taken up from the blood by any part, the function of which is arrested. The change effected by function is from life to death, and from death to life, the chemistry by which our bodies are kept alive causing the introduction of new dead matter into the living substance to be vivified, while

removing an equivalent portion of the living substance in the form of a dead compound, to serve as food for plants. In short, the functions must be kept busy, each function to its right purpose, neither idle nor overworked, in order that the powers of the body and mind may be well developed, efficiently performed, or long preserved. This truth explains the experience of such men as John Wesley. He was a valetudinarian in his youth, in consequence of being impressed with a notion that by great bodily abstinence and incessant study he should the better fulfil his religious duties and conquer his temptations. But he found that what he needed was, to fight against them by thorough employment, instead of lazy meditations and starvation. By the latter means he had so greatly injured a good constitution, that the physicians thought him consumptive; but being aroused by their apprehensions and his own, he undertook a long journey on horseback, which involved just the regimen desirable in his case, and so his malady soon disappeared. The physical endurance of this extraordinary man henceforth became so improved, by engaging all his powers to the utmost under the wise regulations of a mind and conscience that recognised the duty of rest as well as of labour, that he accomplished an amount of work, and attained a length of active life, quite astonishing to those who do not consider that power is preserved and improved by duly employing it, because perfect repose and a healthy activity of function are thus alike secured. Wesley's life is most instructive, by showing us the benefit of keeping

busy. In his eighty-fifth year, he thus writes:—"I do not find any decay in my hearing, smell, taste, or appetite, nor do I feel any such thing as weariness, either in travelling or preaching, and I write sermons as readily, and I believe as correctly, as I ever did."

He imputes his health, under Providence, to the following means:—

1. Constant exercise and change of air.
2. Never losing his rest at night.
3. To his power of sleeping at any time.
4. To having risen constantly at four in the morning for sixty years.
5. To having preached every morning at five o'clock for fifty years.
6. To having little pain, sorrow, or care.—*Journal*.

It is calculated that he travelled more than two hundred and eight thousand miles, and preached at least forty thousand four hundred times, besides a multitude of incidental labours. He was temperate in all things but labour. He lived on twenty-eight pounds a year, and gave away in charity upwards of thirty thousand pounds.

Many young men preparing for the ministry, having endeavoured to become suddenly literate, have killed themselves with study and inactivity of muscle, while others, emulating John Wesley's labiousness, without possessing his constitutional energy and calmness, have first exhausted their brains in the library, and then wondered that their bodies were unfit for toil. *In mediis tutissimus*, and to attain the best state of body and mind, the day

should be so divided as to afford opportunity for the full exercise of both; for the memory and the feelings will partake of the physical tone, and there will usually be a readiness for rest as well as for action, if the muscles and the mind are equally employed.

The grand secret of health, life, and usefulness, consists in our power to control the passions, and to proportion the supply of food and rest to the amount of mental and corporeal exercise. When the labour and waste exceed the rest and supply, a man begins to starve; and if his body be kept just within the absolutely famishing point, it is exactly in the condition most favourable to that state of ferment and decomposition known as putrid fever. Thus it was with the thousands of poor Irish during their potato failure; and thus it is with all who are subjected to famine in sieges, and many other forms of "man's inhumanity to man." Wherever ignorance and wickedness interfere with the due use of providential bounty, there the people must perish. Under such circumstances, both body and soul become inactive and unable; for listlessness from want of nourishment is a natural and protective result, as without sufficient food effort would only hasten destruction. In fact, if a man without proper aliment exert his muscles, his blood will soon be converted into a putrid poison, like that of certain animals when hunted to death; and in this manner bad food and excessive toil kill the slaves in Cuba and Brazil as fast as the enormous and accursed traffic in human beings can supply them.

## CHAPTER V.

### REST AND SLEEP.

“MOTION,” said Socrates, “is good both for body and soul.” So is rest. As every muscular effort and every effort of thought expends some portion of bodily and vital power by so far destroying the very substance of the body itself; and as the restoration of power and substance cannot be thoroughly effected while the effort or action is kept up, it is manifest that occasional periods of complete muscular and mental repose are absolutely necessary, since without it the equilibrium between waste and supply would be fatally disturbed. Life is indeed destroyed both by over-action and by excessive rest. The will must use the muscles, and sustain attention through the senses, in order to health; but the will must be entirely withdrawn from them in order to the restitution of their exhausted power; for while awake we continue to use the muscles in preserving our position with regard to objects, and the will is always acting against gravitation in all our movements.

The chemical physiologists appear to have proved

that the blood and lymph are alkaline fluids, and that the fluid existing in the substance of the muscles and the glands is acid (lactic, inosinic, and phosphoric). We have therefore the conditions of an electric current between the blood and flesh, so that it is not improbable that such a current has some share in the vital processes going on between them. Nerve and muscle are in opposite electrical conditions, and it is possible that the nervous energy impelled by volition may influence electrical action in muscular effort, and thus account for the necessity of resting the will as well as the physical apparatus in sleep. The repose of the muscular system is never completed except by sleep, and without this "sweet restorer" we should speedily become insane; every nerve would ache, every fibre thrill, until excess of sensibility terminated either in the wild dreaminess of furious madness, or in the semi-sleep of fatuity.

Unless the brain be either inordinately exerted or diseased, a tendency to sleep is induced on the return of stillness, whenever the nerve-power and muscles have been duly exercised. A drowsiness, without preceding activity, is a proof that the system is oppressed by bad blood and a poor brain, or that the person so afflicted is subjected to evil habit, indolence, or some other disorder. And we may learn a valuable lesson from the circumstance, that the more the involuntary or vegetative functions and forces are engaged beyond what is needed for the uses of the muscular system, the more unfit for use the muscles and the brain become. Hence indul-

gence of the stomach, without proportionate exercise, weakens the mind as well as the muscles ; and at the same time diminishes the animal firmness and courage, for these are determined and exercised, for the most part, in proportion to the degree of energy with which the will acts upon the muscles, and thus excites the heart, brain, and lungs. Hence, also, a man's character becomes fixed, according to its outward realness ; his principles are truly embodied in his practice ; and in proportion as a man carries out in his actions what he admits into his creed, will this bodily habit and constitution assume a corresponding consistency and constancy. Our waking life is that of our passions, and our limbs and features are always expressing them. Thus the notion which unbiassed and intelligent persons form of a man's habitual state of mind from his features and his manners, supposing him free from disease, is seldom very wrong, for clothing cannot hide a man's soul as long as he is able to move.

Whatever rouses the circulation, especially in the digestive organs, without correspondingly empowering the muscles, produces a state similar to the active stage of fever. Thus, persons who addict themselves to the pleasures of the table, are very apt to become feeble in body, and imbecile in purpose, unless they also labour severely in some manner that shall mentally call forth their natural energies ; and every one is aware that those who give themselves up to the power of stimulants, soon lose all control alike over their limbs and their intellects. Thus every fit of drunkenness, in proportion to its completeness,

is a palsy as well as a madness, and each repetition of such a fit tends to produce a condition of body in which either the madness or the paralysis, or both, become permanent, unless some other deadly disease anticipate the usual event. Any inordinate, and especially any monotonous, and yet exciting exercise of the brain, as in reading novels, or in thinking under the influence of strong and persisting passion, without due exercise and timely rest, will vastly disturb the balance between the nerve-power, the blood, and the muscles, and thus predispose to insanity and nervous diseases, as may be proved by the testimony of every madhouse in the world.

Danger lies in extremes : a man may be driven to death by his own restless will, as well as by the cart-whip ; and his bodily necessities are scarcely more tyrannical than his passions. Every feeling, affection, and thought, influences the life and substance of the body, because the body is the organ and instrument through which, and in which, the soul is both manifested and impressed. In order to secure health, moderation and sobriety are as necessary in our thoughts and affections, as in our actions and our appetites, for without moderation and sobriety the brain becomes so weakened as to be incapable of a full awakening, so that either the soul cannot use the senses rightly, or else it takes on a disordered activity, which neither permits the partial repose of peaceful reverie, nor the more perfect rest of true sleep, but, as in confirmed melancholy, both in sleeping and waking, life is all a troubrous dream. If, then, we would be manly in body and in mind,

we must exercise our faculties vigilantly and on principle, with a view to control our appetites and desires, so that they may but stimulate and energise our reason, to use the body without abusing our higher being. That our faculties may attain their highest development, they must be exercised in becoming efforts in relation alike to our socialities and our selfhood. Thus, rest and action will alike advance us, for the nerves, through which the mind operates, are invigorated during sleep in a manner to strengthen the mental habit while awake; and the direct operation of Divine power in the ordinances of nature confirm the resolution of those who really seek that wisdom which comes from above.

If we would learn what it is that gives dignity to the human form, we must look at it either asleep, or lying dead, "a slovenly unhandsome corse," when all hypocrisy is laid aside. We must all sleep, and we must all die. The majestic and the mean, the despot and the slave, the hero and the idiot, must equally become passive and helpless in their slumbers, and the dignity of a babe is as great as that of a king, when the assumed state is withdrawn, and the limbs lie as they list. Hercules, tired of his toils, and the infant weary of his play, rest alike in their helplessness, and the Lord of life and of death gently, and with equal hand, must close their eyelids, and with the breath of life refresh all their faculties, to prepare them for to-morrow's daylight and activity.

"Half our days we pass in the shadows of the earth, and the brother of death extracteth a third part of our lives," says Sir Thomas Browne. Sleep,

however, is only so far like death, that the mind is withdrawn from the outward senses by an influence beyond our control, and, instead of destruction, we experience in sleep only the renovation of the powers by which the soul operates in the body. The quantity of sleep required by any one must depend on the facility with which the power of the nervous system is restored, and this is determined by conditions utterly beyond our scrutiny. It is remarkable, that young and growing animals need most sleep, and that the soundest sleep occurs before mental consciousness is evinced, as, for instance, in new-born infants. We may conclude, from all we know of the physiology of the subject, that the most refreshing sleep is that of which we remember the least, and into which, and from which, we pass most quickly and quietly. We should seek to proportion our sleep to our temperament of mind and body, endeavouring to attain that degree of command over attention that we may sleep whenever so determined and disposed—that is, whenever we resolve to disengage our minds from objects. Probably it is a proof of a disordered condition of brain whenever this cannot be accomplished; and it is quite certain that the feelings must be inordinate in that over-consciousness of self which will not allow a weary man to sleep. The brain must be morbid, when such a man is incapable of dismissing his ideas, and continues seeing and hearing, and feeling in thought, though he closes up all his senses. He is most likely to reach longevity who has acquired the habit of sleeping at will, provided he lives actively while

awake. The most energetic men, and those possessing on the whole the healthiest brain, are those who, like the Duke of Wellington, as it is said, can sleep at will. There are, however, multitudes of very animal kind of men, who can sleep with equal facility, with no other resemblance to the Duke, the grand difference being that they cannot wake to equally good purpose. Industrious persons, of unimaginative dispositions, usually sleep whenever they are still, the state of brain and heart always favouring their repose ; but persons who exercise their mental faculties to excess, are apt to complain of inability to obtain sleep when most needed. The influence of strong mental effort, and of inordinate excitement, seems to be similar to the excessive use of narcotics and stimulants ; a small quantity of either occasionally used produces a readiness to rest, but a habit of resorting to them causes that tension of the nerve which renders it most highly impressible, and as responsive as an *Æolian* harp to every passing movement. When a man becomes habitually indisposed to sleep at the seasonable hour, he may conclude that he is suffering from some habit of excess, and he should at once alter his style of living, change the objects of his thoughts, and take all the bodily exercise in his power short of painful weariness. Some monotonous bodily action, or unexciting game, is a valuable auxiliary in our endeavours to obtain sound sleep.

There is one point of great practical importance to weakly constitutions in relation to the time of taking meals. Our late dinners are very objection-

able, as they allow little opportunity for proper exercise during the later stages of digestion, when air and exercise are of most value, that is to say, about three or four hours after the meal, for it is then that the new chyle is most abundantly passing into the heart, and most demands fresh air and that exercise which facilitates the changes of the blood. The want of this exercise, followed, as it often is, by a full supper, is apt to produce bad nights.

It is evident that sleep is intended to restore the waste of power produced by muscular action, and by the air acting on the blood, and therefore it should be proportioned to the demands made on the body by exercise, according to the temperature of the air and to the period of life. A child cannot labour, and also grow without very much sleep, and at first the supply of food and of sleep should be equally liberal, and the exertions of the muscles no more than sufficient to promote their development, or just such as is voluntarily taken in play. Constrained toil and broken rest soon cause young persons to appear aged, stunted, weak, and wretched. From ~~✓~~ fifteen to twenty hours for an infant; twelve hours from the ages of five to twelve; ten hours from the age of twelve to sixteen; nine hours from sixteen to twenty-four; and for a healthy adult seven hours, are respectively sufficient times for sleep. Old age ~~✓~~ naturally brings with it less ability to obtain perfect repose, but the nearer the amount of sleep can be kept to that proper for the adult the better; such an amount, however, cannot be secured without vigorous digestion, and a proportionate ability to take

exercise. By steady perseverance in taking an amount of exercise equal to their power, persons advancing in life may do a vast deal towards prolonging their lives and rendering them both cheerful and useful; but any overstrain of muscular power is peculiarly injurious in declining life, since the restorative power is then so greatly diminished that it requires more rest than is good for the functions generally in order to recover from fatigue at that period.

Sleep is more especially required for the reinvigoration of the voluntary muscles: the heart never sleeps, and its stimulus is ever present. The consumption of the materials which furnish force to the involuntary processes of life must of course continue during sleep, but still there is no doubt that an accumulation of energy takes place in every part during our slumbers, and the brain cannot be refreshed without refreshing the whole body.

The essentials to healthy sleep are ease, timely retirement, good air, a comfortable degree of warmth, the absence of glaring light and irregular noise, an unrestrained position, freedom from abdominal distention, a sound skin, and a quiet mind. Habit has, of course, very much to do in the matter, and sudden changes affect all persons more or less, according to their violence and the impressibility of the individual subjected to them. Our habit of sleeping at certain periods and for a certain length of time cannot be interrupted without injury. Persons who have reached a great age have always observed regular and early hours, at least in their riper years.

If the head be hot, cold water or an evoporating lotion of vinegar and water, or a wet bandage, will help to promote sleep, especially if other parts of the body be kept warm. When the forehead is cold and the body generally warm, and the pulse not too strong, a stimulant almost invariably produces sleep, provided there has been sufficient exercise previously. In most instances it is advantageous to lie on an inclined plane, or with the head raised, but not so abruptly as to produce a strain upon the muscles of the neck, for any spasmotic or irregular action of these muscles is peculiarly disturbing to the brain. The spine should be thoroughly relieved from all pressure or external cause of irritation, and for this purpose it is better to lie on an elastic mattress laid on the feather bed, for thus the pressure is better distributed and the body preserved from excessive warmth. Very delicate persons are evidently influenced by the direction in which they lie in relation to the magnetic current, and most persons would sleep more comfortably with the feet towards the south than in the opposite direction, though this would be much modified by the degree of light admitted to the room. An ill-aired bedroom is apt to produce feverish dreams and headache, with mental confusion, lassitude, ill-temper, and other effects similar to those produced by abuse of the passions, such as a depraved state of blood, bad digestion, flatulence, and a vast variety of nervous disorders. Mental effort carried to an extreme most readily produces sleeplessness in consequence of the feverishness of brain it excites. This is best re-

lieved in the same manner that feverish heat is always best relieved—by cooling the surface, as already shown. The practice of the famous Harvey was significant alike of his character and his skill: Aubrey states that, "His thoughts working would many times keep him from sleeping, in which case his way was to rise from his bed and walk about his chamber in his shirt till he was pretty cool, and then return to his bed and sleep very comfortably." This course might be adopted by many studious persons with advantage, but it is far better to avoid that excess of study which induces unnatural vigilance, for it is sure to weaken all the functions, to disorder the digestion especially, and to produce a bad state of blood, as it did, in fact, in Harvey, for he was miserably tormented by gout. There is no wiser plan than to limit the severer study to the earlier part of the day, and spend the latter part of it in open-air exercise and the socialities of friendship. Reading aloud to a companion serves the purpose both of wholesome exercise and mental refreshment, and by engaging the brain with others' thoughts instead of one's own, gives one an outward energy and enlargement of soul most akin to that which springs from stirring conversation.

The watchfulness arising from disease is of course likely to aggravate its cause, but happily in that case the means of obtaining rest are usually those also which are best adapted for relieving the disease. I would not, however, advise any one to get addicted to opiates; scarcely any habit is more destructive to happiness. Opium is not fit for domestic use, except,

perhaps, as an external application in case of local pain. The extract of lettuce is, however, a safe and very useful soporific, and a few grains of it will often succeed in causing sleep when the brain is in an irritable state and would only be injured by opium and stimulants. The hop, also, is an excellent soothing medicine, and for a sound stomach I know no better preparation of the plant than good ale. An advantage of the hop is, that it rather improves than impairs digestion. A monotonous sound is soothing if not acute ; fixing the eye on an imaginary object, seemingly a few inches before the face, as if, so to say, looking at nothing in a microscope, favours sleep ; and the repetition of a few well-known words over and over, or counting a large number, one by one, will often succeed in quieting the brain, and bring the action of the heart and lungs into that slower reciprocity of movement which occurs during sleep, and prepares for it. The grand point is to withdraw the mind from objects and the ideas of objects, but this cannot be accomplished when the nervous system is much agitated by emotion or by disease, and in this case medicine may be needed to divert the nervous energy from its disordered activity ; but it often happens that the soothing hand of friendly sympathy, or even the mesmeric pass, or a few fond words, do more towards relieving the restless spirit, than could be effected by any other mysterious agency.

If a dyspeptic patient cannot sleep, he should test his doctor or his diet, and be sure he says his *credo* with all his heart ; in general, he will find something

wrong in his regimen or his medicine, or his habits of thinking and acting; and he may almost always conclude that he has been attending somewhat more to his own body than to more agreeable objects, and has not been so busy as he might have been in promoting his health, by enjoying the smiles of nature with his friends and his neighbours. Thorough disease, however, is not to be cured by an effort of the will; and a body that hangs like a perpetual burthen on the mind requires the best attention which skill and kindness can bestow. Our remarks in this place are chiefly directed to those who do not need medicine, but require exhortation and encouragement to exert themselves for their own benefit. Really, there is scarcely a maxim of more importance to a weakly person than the old one, that enjoins the propriety of keeping the head cool by moderation, and the feet warm by exercise. Multitudes of young ladies get bad nights beyond number, and maladies unnamed in nosology, in consequence of sitting in the drawing-room, or elsewhere, with plentiful excitement of the brain and heart, but without exercise, and with feet, as they say, like stones. The causes are evident enough,—thin shoes, flimsy stockings, and no business to employ their limbs, while their heads are agog with fancies, and their hearts in stays. To retire to bed habitually in such a state, as many do, is to lay the foundation for numberless miseries from every kind of irregularity of the system, not unfrequently terminating in frightful nervous disorders, and sometimes in consumption. The remedy is found in lambs'-wool and

worsted, and in walking, or even romping and dancing, if convenient, between tea and bed-time.

Irrespective of marked disease, all varieties of fidgets, in bed or out, are best prevented by a daily sufficiency of wholesome bodily occupation, a temperate stomach, a mind employed, a skin in good order, and a conscience that brings no pointed accusations.

## CHAPTER VI.

### OBSERVATIONS ON FOOD IN RELATION TO CLIMATE AND CONDITION.

THE reader will now be somewhat prepared to apprehend the nature of disease, and to appreciate the care and skill which a full investigation of the subject requires. To render the study of health and disorder easy is impossible, for although a primer may be useful as the first introduction to any science, yet as it is the will of Heaven that idleness and ignorance shall be put to shame, it is ordained that no considerable knowledge of the mysteries of existence shall be attained without patient and laborious inquiry.

If we consider what has already been said concerning the blood, and its dependence for health on aliment, air, exercise, and repose, we shall in some measure understand how we may become physically morbid, 1, by any cause of disturbance conveyed into the blood through the stomach ; 2, by influences operating directly on the nervous system, as emotions of the mind ; 3, by local or endemic peculiarities ; 4, by changes of temperature, and other

conditions of the air. We shall also perceive how any cause of disorder will be modified and resisted according to the individual constitution, and its degree of power at the time of its exposure to the disturbing influence. Probably the most general cause of disease is some impropriety in the choice, or some mismanagement in the use, of food, and to this we shall first direct attention.

Nitrogen constitutes four-fifths of the air we breathe, but not a particle of it seems to be admitted to the blood by the lungs. As stated, when speaking of the blood, it appears that the oxygen alone is absorbed through the lungs, the nitrogen being ordinarily taken into the system only through the stomach, having been in the first place removed from the atmosphere by vegetables, and organized by them so as to become adapted to form our sustenance. Nitrogen in combinations that are not organized is the deadliest poison. No substance can be fit to be constantly used as food that does not contain all the elements essential to the organs and to their functions. Should a man, for instance, attempt to live on pure oil, or sugar, or starch, even with suitable salts, he would in the ordinary state of the nervous system soon die, because these substances contain only the elements of fat, which, indeed, answer the purpose of keeping up the action of the lungs, and the warmth of the body, but do not restore the waste of organism in vital action. People who live much in the air, and whose bodies are kept by exercise in a lean state, or who have the skin much exposed to the atmosphere, and thus cooled, find a

draught of oil a cordial, and a lump of sugar a great delight as well as benefit. Thus both the wanderers of the Desert and the inhabitants of the frozen regions equally refresh their lungs and their lamps from their oil-vessels; and sweet substances are almost necessities of life among those who cannot obtain much oil or fat.

What blubber is to the Greenlander, "the fatness of the olive" and the palm is to the half-naked Arab. By the bounty of Providence, the produce of each land is generally best fitted to the wants of its inhabitants. In warm climates, the sweet cane, the luscious fruit, the starchy grains, maize, millet, rice; and then, in the temperate zone, barley, wheat, and rye, are most abundant and most desired; and all these contain much starch, which it has been shown is converted into sugar by digestion. In the colder temperate climes, the pasture for cattle and the plain for corn are equally distributed; and where animal fat is required for the sustenance of mankind, there the feeding of cattle is facilitated, and what is wanted is found. In the Torrid zone, it is hardly possible to fatten any animal, while within the Arctic circle every living creature is encased in a thick coat of fat, which increases as the long winter night approaches. Fat, sugar, and starch, consist of carbon, hydrogen, and oxygen, and they differ from each other only in the relative proportions of these. Starch is converted into sugar by the addition of oxygen as in digestion and in germination, and seems to be effected for the purpose of furnishing carbon to the living body in the most available form, for the promotion

of breathing and warmth, sugar being a perfect combination of carbon with water. To twelve proportions of carbon and ten of hydrogen fat has only one of oxygen, while starch has ten, so that, chemically speaking, fat is a better supporter of combustion and warmth than starch, by nine to one—that is to say, it requires nine times the quantity of oxygen to be breathed for its consumption.

But however necessary this excess of carbon and hydrogen in fat may be for maintaining warmth, a due proportion of nitrogen is necessary, and without food containing a sufficiency of some flesh-like or proteine-compound, the body must starve or fall into a feeble state, like that of the poor people of Egypt and India, who enjoy a degree of low health while permitted to lie luxuriating in the warm air, but die by thousands of epidemic diseases, whenever their own necessities, or the tyranny of their lords, force them to any labour. Hermits and anchorites may reach a wonderful old age in quiet inactivity, while they peacefully meditate in caves and grottoes in a genial clime, their diet of dates and roots being supplied without toil, but all who labour to induce the earth to yield her proper increase must be well fed, and as they wear their powers, so repair them. Inactive persons, however, must be abstinent, or they will become gross or diseased ; for whether their food be vegetable or animal, or mixed, if the breathing and the muscular exercise be not proportioned to the digestion and assimilation of materials, these must accumulate in the system to encourage the incursion of disorder, or where disease exists preserve it in full activity.

It has been proved by cruel experiment, that no substance will long support life in any climate that does not contain ingredients more or less resembling those found in milk, flesh, and the gluten of wheat. Men have opposed the laws of Providence in endeavouring to make inferior food, such as potatoes and rice, which are very fit for warm climates, the staple subsistence of our labouring population, instead of encouraging the use of these only as auxiliaries to bread and animal food. For the purpose of diversifying our diet, and so far improving it, potatoes and rice are very valuable, but, as ordinary food, they are insufficient for the demands of the active body in a climate such as that of England. In order to sustain the body in any degree of power by such diet, it is necessary to take a very large quantity with much salt; thus an Irishman requires from seven to ten pounds of potatoes per day; and a Hindoo, who lives chiefly on rice, consumes a greater weight of it in a day than one of our labouring men usually consumes of food altogether in two days. The necessity of this large consumption is seen at once in the fact that their food is so deficient in flesh-forming substances. As a race, the Hindoos are feeble and predisposed to diseases not unlike those prevalent among the impoverished inmates of ill-dieted work-houses. Their children are remarkable for the unsightly development of the stomach, and Dr. Budd has shown that they are very subject to diseases of the skin, and to ulceration of the eye, and consequent blindness, just as were the dogs on which Majendie experimented by feeding them on substances that

did not contain the proper elements of the blood in sufficient quantities.

By inattention to the requirements of the body, immense mortality has been ignorantly encouraged, especially under the prison discipline of former times, as when Howard exposed its horrors; and in many places, even now, such a philanthropist would find abundant occasion for his labour, if not in the prisons, certainly in the cottages of our land.

In the prison of Nîmes, in 1839, though the diet was at the time insufficient, it was, by royal ordinance, further reduced, and then one in seven of the prisoners died in the course of the year—a mortality equal to that of the London Fever Hospital. Under the new regime, in 1848, the diet being improved, and the labour diminished, and a little wine and tobacco allowed, the number of deaths fell from 162 to 16, the average population being 1200, all adults.—(*Annales d'Hygiène Publique, Jan. 1849.*)

Our organs, we have said, are repaired and reinvigorated only by the use of substances containing some proteine-compound, found most abundantly in flesh, in eggs, in corn, in leguminous seeds, and in milk; but the elements required to keep up the warmth of the body, carbon and hydrogen, are chiefly derived from substances containing fat, sugar, gum, and starch. Now in the cereal seeds, but especially in good wheat, we find all the elements essential to the health of man, except common salt and water, which in use are always added. We have 19 per cent., according to Davy, of that proteinized substance—gluten; and carbon, hydrogen and oxygen in due

proportions, for the formation of fat, and to keep up the animal heat; and there are also the necessary compounds of sulphur, phosphorus, iron, calcium, and potassium. But a labouring man could not obtain enough of these elements fully to restore his waste of substance on a cold day, on less than three pounds of dry wheaten bread. Fermented bread is less nutritious than unfermented, in consequence of a part both of its gluten and its starch being decomposed and lost, and therefore that is a valuable invention by which bread is rendered light, and yet not fermented. The relative proportions of starch and gluten in different grains, may be seen thus:—

	Starch.	Gluten & Woody Albumen.	Fibre.	Gum.	Sugar.	
Carolina Rice	85.07	3.60	4.80	.71	.29	Braconnot.
Odessa Wheat	56.50	14.55	2.30	4.90	...	Vauquelin.
Oat .....	59.00	4.30	...	2.50	8.25	Vogel.
Maize .....	80.92	5.75	8.71	2.28	.89	Bizio.

If more than enough of the warming elements than suffices to meet the demand of the system in exercise and breathing be taken, it is either productive of bilious disorder, or is deposited in the appropriate cells of the tissue as fat, thus forming a reserve of fuel for future use. Too great an indulgence in sweet, rich, fattening, and farinaceous food commonly causes enlargement of the liver, and the man who thus indulges must excite some such malady, or else be burthened with an unsightly accumulation of those materials of combustion which should be expended in maintaining action, instead of encumbering the springs of their own life. *He who will not work, neither should he eat*, is the philosophic

axiom of an inspired apostle. Nothing but inability can excuse our withdrawal from active duty. Exertion of mind, however, exhausts the blood as much as any other labour.

He who is well supplied with food, and takes exercise in the open air in proportion to his food, all other circumstances being equal, will breathe most freely, have the best blood, the firmest muscle, the clearest brain, and the highest development of the whole body. One who does not observe the laws of nature in these respects will find a nourishing diet dangerous alike to his life and his temper; for a blood that is too rich or too abundant is sure to over-excite both the brain and the heart. The remedy for this excess is abstinence, with activity. The habit of taking more food than sufficient certainly disturbs all the nervous sympathies between the brain and the other organs, so that a glutton is generally not only incapable of much intellectual effort, but he is also more at the mercy of his animal passions, and apt, as the Scripture asserts, to be led by the devil at his will. We must keep the body under by not indulging it, or otherwise it will rule us.

When too much food is taken into a feeble or disordered stomach, it always produces some degree of surfeit, a state in which the aliment is partially converted into poison. It was stated in a former chapter that healthy digestion seems to be connected with a slight putrefactive fermentation, which is checked at its commencement by the action of an acid fluid secreted by the lining of the stomach, and oozing from it as the occasion demands, like the

perspiration from the skin: now, if this gastric fluid be not produced in proper quantity, or the aliment be too abundant or unsuitable, instead of nourishing the body, it causes distress and disorder, by the generation of noxious gases, which distend and irritate the congested stomach.

The causes that may disturb digestion and assimilation are very numerous, but the chief are—

1st. Food or drink unfit for the body at the time of using it.

2nd. Nervous disorder and debility.

3rd. Inefficient action of the skin, the kidneys, the bowels, the lungs, and the liver.

The choice and quantity of food should be determined, as far as possible, according to the amount of exercise, and the habit of the individual. A healthy stomach will not be fastidious if both body and mind are duly employed;

“Nothing so foreign but the athletic hind  
Can labour into blood.”

But a morbid state of stomach is best accommodated with the simplest diet, and the most moderate supply, taking care that the appetite be consulted, as far as possible in consistency with the principles on which digestion and nourishment depend. Convalescents, young children, and debilitated persons, usually need a frequent supply of food—four, five, or even six *small* meals during the day being not unfrequently advantageous to them.

A weak stomach, however, requires rest as well as a strong one, and unless the quantity of food be well proportioned to the power of digesting, all the

evils of a debilitated stomach may be increased and perpetuated. But above all things, in such a state it is necessary to guard against the disposition to soothe the stomach by taking either slops or stimulants. The best plan in such cases is to use very little fluid, and that only with the food, and no more than enough to moisten it or reduce it to a pulpy consistency; thus the appetite will be best appeased, and the gastric juice be enabled to act most efficiently, so as to prevent unhealthy fermentation. The proper intervals between the meals must depend on the solidity and digestibility of the food; but it is well in all cases to allow the stomach to express its wants somewhat unequivocally before it is supplied, and as digestion is rather an interruption to the functions perfected in sleep, it is wise, for a healthy person at least, to avoid suppers. Positive rules, however, are not quite safe, but the law of moderation is unexceptionable, and prudent persons will readily discover its limits and keep within them. The digestion of a light meal is generally completed in four hours, but the process is delayed if the food be very consistent, or taken too freely.

It is by no means to be supposed that we are required by nature to wait until the stomach is absolutely empty before we take a fresh supply; this rarely happens, and the digestion of the new meal is assisted by what remains of the old, provided we observe moderation. In the diet of strong and healthy persons, there should be a due mixture of animal and vegetable substance, so prepared as to be softened, but in no degree decomposed, by the

action of the fire, and the mode of preparation very much influences the quantity required.

From thirty to forty ounces of *solid* food is required daily by an active man. Our soldiers and sailors are the strongest and healthiest in the world, and their diet will afford a good criterion of what is wholesome for those who wish to be fit for full exercise. In this country the soldier's daily rations consist of three-quarters of a pound of meat, one pound of bread, about a pound-and-half of potatoes or other vegetable, and two ounces of butter or bacon, with a pint of beer. In our navy the rations are still more liberal, from forty to forty-five ounces of solid food being allowed, with a little vinegar, and some tea, and a gallon of beer, or a supposed equivalent. This is an excessive quantity of fluid, unless, perhaps, in active service, when sailors work as hard as our peasant labourers in harvest.

The farmers in Devonshire and Dorsetshire find, as they say, from experience, that a gallon of beer or cider is not too much for men so engaged, and they supply each man accordingly. The solid food taken is not, however, in proportion, and there is much reason to believe, that a far smaller quantity of fluid would answer better, and really diminish the waste caused by perspiration. It is worthy of remark, that gout is almost unknown among common sailors and soldiers, and that labouring people seldom evince any predisposition to it.

The solid food daily allowed to able-bodied paupers—twenty-six ounces for males, and twenty-two for females—is not sufficient, unless the object

be to *subdue* them; and if this treatment be excused on the ground that many labourers consume less, we can only say that *felons* are found to need at least thirty-six ounces, to labour and be in health.

The effects of a starving dietary has been several times unintentionally tested at Millbank Penitentiary, and it has been found that epidemics, as they are called, may be produced almost *ad libitum*, by famine. "On one occasion," observes Dr. Gooch, "the prisoners were suddenly put upon a diet from which animal food was almost entirely excluded. One ox's head was made into soup for one hundred people!" What was the amount of other aliment we are not informed, but we are told that the prisoners "lost their colour, flesh, and strength; and at length, this debility was succeeded by scurvy, dysentery, diarrhoea, low fever," and many other affections of the brain and nerves which result from "a faded, wasted, weakened state of body," such as headache, vertigo, delirium, convulsions, apoplexy, and madness.

It should be understood that the offices of nature require that the food be not in too concentrated a form, but that there should always be something excrementitious or refuse in our diet, something not to be digested, but to promote the functions of the bowels. Bran in the bread, and vegetable fibre, usually answer this purpose very well. The importance of excrementitious substances in our food is shown, on a large scale, by the circumstance that those Indians who live entirely on animal substance become diseased unless some part of their food be

so charred as to be insoluble. Much of the inconvenience experienced in civilized society arises from the refinement of the food, and the entire absence from it of those adjuncts which Providence originally connected with it, such as the husk of the cereal grains. Earthy matter is found useful under some circumstances, among uncivilized tribes, and the Esquimaux employ powdered sea-weeds and mosses when obliged to live much on oil or fat. Even in Sweden, near Urnea, the natives mix what they call mountain-meal with their flour, and find it favourable to digestion. This substance consists of the siliceous shells of certain polygastric animalcules, and of course contains nothing nutritive in itself.

Whatever food or drink the inhabitants of any climate habitually prefer, they usually find suitable to keep up their strength; it is what God in his good providence furnishes for them, and therefore a moderate use of the diet commonly employed in any country will, with proper regard to all the other requisites of health, be found safe and healthful under ordinary circumstances. Many good authorities might be quoted in proof of this truth, but the following will suffice:—Dr. Daniell, in speaking of Rio Formosa, says—“I found two vessels moored at its mouth, one of which, within the space of five months, had buried two entire crews; the other, which had entered much later, had been deprived of half its men, and the remainder were incapable of laborious duty. And yet,” he adds, “amid the regions so rife with disease and death, I have known Europeans reside for a number of years in the

enjoyment of good health, from the simple secret of moderately conforming to the habits of the natives as regards diet, exercise, and attention to the due performance of the cutaneous functions."

To the same effect is the testimony of Colonel Sykes, who, in his valuable paper on the "Vital Statistics of the Indian Army," observes—"The climate in India is less to blame than individuals; for in case foreigners find the people of the country healthy, they should, to a certain extent, conform to the habits of the natives, to be healthy also."

But the worshippers of Mammon are so constantly endeavouring to frustrate the benevolence of God by their selfish interferences to make a better market of his bounties, that articles in common use are not always to be trusted among us. The adulteration of food is fearfully prevalent in this country, and those who practise it ought to feel, that though they regard not that law which is Divine, yet human law is actively against them. The most important adulterations are probably those of bread and flour. The tricks practised by millers and bakers to disguise unsound flour are innumerable, but I will confine attention to that most generally practised—the addition of alum for the purpose of whitening bread, and imparting to it that *shortness* which distinguishes town-made from true home-made or farm-bread. It may be fairly inferred that a vast quantity of flour is used up with the help of alum, that would never be eaten without it, since its state when made into bread and pudding would show that it was partially decomposed, and not fit for the stomach.

Gypsum, or plaster of Paris, (sulphate of lime,) is also used to improve the appearance of bread, and to prevent too rapid a fermentation of unsound flour, as of that from corn that has germinated, which has a tendency to turn the starch into sugar, thus causing the flour readily to run into a sour fermentation. Sulphate of lime taken in food is apt to be deposited in the lungs, there producing disease very like consumption, and a person predisposed to asthma can scarcely swallow a little of this substance without soon suffering from difficulty of breathing. Alum is perhaps less immediately mischievous, but irrespective of the evil effects of swallowing bad flour, thus disguised, the habit of taking several grains of alum every day, as most of us do in our daily bread, must be prejudicial to health, for it contains matter quite foreign to the blood, and capable of producing much disorder in it. How far this substance contributes to swell the list of nervous and febrile maladies, we know not; but this much we do know, from actual observation and experiment, that a small quantity of alum, when constantly used, impedes the peristaltic movements of the bowels, disorders the bile, aggravates indigestion, spoils the complexion, and predisposes the body to fever, and the mind to fretfulness.

*To detect alum in bread,* soak a little of the bread in pure water, pour off the clear liquor, and drop into it a few drops of solution of muriate of lime. If alum be present, a white powder (sulphate of lime) will fall down; the sulphuric acid, leaving the potass and alumina of the alum, unites with the lime of

the test, and the muriatic acid combines with the alkalies of the alum, and remains dissolved. Gypsum may be detected by thoroughly dissolving the suspected bread in a sufficient quantity of hot water, and allowing it to stand, that any precipitate may subside.

The quality of flour may be tested by mixing a little powder of guaiacum with it in water. If the flour be good, and rich in gluten, a fine blue colour appears, but in bad flour the blue is scarcely visible.

The disadvantage of ferment in bread is, that it decomposes a part both of the gluten and the starch, and whatever is lost by the change is a diminution of the nutrition to be derived from the flour. None of the ingredients of flour can be discovered in fermented bread; the elements are grouped anew, and in such a manner as to be extremely liable to further change. Hence, in certain states of weather, bread quickly becomes *ropy*, sour, and even putrid. The process of fermentation is arrested by the removal of moisture in baking, but in damp warm weather the bread is apt to absorb water from the atmosphere, when the fermentation recommences, and quickly passes through all its stages, saccharine, alcoholic, acetous, and putrefactive. This process is often completed in a weak stomach, but may be prevented by thoroughly toasting the bread. It should be remembered that a vegetable acid in contact with gluten always generates a ferment, and that putrid or partially putrid animal substance excites a putrid fermentation in whatever substance it touches of a nature to undergo such change. Essential oils,

smoke, creosote, that combination of elements produced by partial burning, called *empyreuma*, and similar substances, check fermentation and putrefaction, and they also impede digestion, so that it is best to avoid them, and to use our food in as fresh a state as possible.

Unfermented bread is useful to certain dyspeptics, but it may be highly injurious. The muriatic acid and the carbonate of soda, employed in a patent process to produce the carbonic acid, are mixed with the flour to lighten it; but they are scarcely ever pure; the acid often contains arsenic acid enough to do great mischief, and several instances are recorded of persons being nearly poisoned in this way. The plan lately introduced at Glasgow is, however, without medical objection. A machine is contrived by which carbonic acid (separately obtained) and water are blended with the flour so as instantly to produce dough of proper lightness, which is rapidly divided into portions, and forthwith baked. Here are all the advantages of fermentation without any of its evils; but I see no reason why carbonic acid should be employed; probably common air would be preferable as a means of producing the desired sponginess of the dough, and the machine would mingle the one with the mass as readily as the other.

As reason teaches man to clothe and shelter himself according to the temperature of the air, he can inhabit almost every land; and such is the accommodating power of his body, that he can generally subsist in strength with the food peculiar to any climate. In the frozen regions, where little or no

vegetable substance fit for food can be obtained, the inhabitants find the coarse flesh of the whale and walrus conducive to health; even those who have been accustomed to the mixed diet of temperate climates have often been enabled to follow the fashion of the Arctic regions with benefit to their bodily vigour. Thus many an English sailor has preserved his health by regaling himself with raw whale-flesh and train-oil. But free exercise, a severely cold air, a sound body, and an untroubled mind, are essential to such an appetite and such a digestion. These observations, however, are only meant to signify that it is sickliness to think too much about the choice of food, and that they do best on the whole who think least of it, while they use the means of obtaining a good appetite, and a good control over appetite, by proper employment of the faculties. Almost any common food is wholesome to a temperate man who preserves his body and his mind in an active but not hurried state; for thus he ventilates and purifies his blood, and brings every fibre of his frame into the best condition for the proper enjoyment and use of life. It is astonishing how much the health is often improved by thinking nothing about it, but just going about one's business, and using the common means of subsistence under the guidance of common sense and a good conscience. But mere ignorance cannot do this, and we must be able to consider before we can reasonably do our duty. Even savages have their rules of health, and no one has ever reached a hale old age without due attention to exercise, air, tempe-

rature, rest, and diet. Although the dietary of soldiers and sailors may prove what is the average requirement in respect to food by persons laboriously employed, yet this average itself indicates that nature is very accommodating, or such a variety of constitutions could not be all treated in the same manner. Positive rules for the direction of appetite are not consistent with nature, and every one who possesses reason will ordinarily find a better guide in his own discretion and good sense than in any dietary that the doctor can direct. But, alas,—

“ Voluptuous man  
Is by superior faculties misled;  
Misled from pleasure even in quest of joy.”

## CHAPTER VII.

### THE PREPARATION OF FOOD, THE USE OF CONDIMENTS, ETC.

THE preparation of food is perhaps as important as the choice, since the most nutritious and appropriate materials may be rendered unfit for the stomach by the art of the cook; and those alimentary substances the least promising may, by culinary skill, be so combined and prepared as to be both digestible and wholesome. In the first place, it should be observed, that cookery is injurious, except so far as it helps to disorganize the substance submitted to the fire in such a manner as shall facilitate its decomposition in the stomach. Those dishes are, on the whole, most readily digested, which would be soonest spoiled, if not used; but, of course, as moisture is necessary to decomposition, such things as biscuits may be well calculated to keep, and yet be very digestible when blended with fluid in the act of chewing, or in any way suitably softened. If food be taken either in too dry or too watery a state, the process of digestion is apt to be impeded; in the

former case, from absorbing the gastric juice without the presence of fluid enough for its perfect solution, and in the latter, by diluting the gastric juice, by allowing too rapid a separation of the alimentary substances, and by passing too quickly into the lower bowels. The superabundance of fluid is, however, usually soon removed by absorption, and disposed of by excretion ; and hence an inordinate quantity of drink, unless too hot, or too cold, or of an exciting nature, is far less injurious to the system than an excess of solid food.

Any method of preserving food from putrefaction, except that of merely drying it, and excluding air and moisture, tends to render the art of the cook less successful in aiding nature, and in meeting the demands of the body for nourishment. Thus salting, smoking, pickling, and similar processes, are all more or less mischievous, since they all cause the combination of some extraneous element with the substance thus preserved, which cannot be separated from it in cooking, and which therefore tends to hinder the action of the stomach upon it. Sugar is probably the least objectionable preservative, and fish and meat, as well as fruit, may be kept by being well covered with it, and that with a much smaller quantity than of salt, and in a far better manner than either by it, or by vinegar, oil, or creosote. Pyrolignic acid, however, should be mentioned as peculiarly applicable to the purpose in many instances, without prejudice to the virtues of the food. Meat and fish may be preserved for months, by being dipped in this acid for a few

minutes, as it acts immediately on the surface, and produces a change there that prevents the air from causing decomposition. Substances thus dipped will not, however, keep so long in the open air, as when shut up where evaporation may be prevented.

Cookery ought not to decompose, but only to disintegrate, the food: neither the proteine compounds, fat, gelatin, nor even starch, ought to be quite changed by the action of heat, but merely softened, and thus fitted to blend with other substances. A heat above the boiling point, such as may be obtained by Papin's digester, and other contrivances increasing the pressure of the air within the cooking vessel, have the effect of decomposing animal substances, and producing an evolution of ammonia. *Boiling*, however, is perhaps the most eligible mode of cooking, since it serves to dissolve the interstitial membrane of animal fibre, and the cell-walls of vegetable substances. That it causes decomposition is, however, evident, since *creatine*,\* *osmazome*,† and other odd compounds of animalized elements, are produced during the decoction of flesh in making broths and soups. Boiling also renders the albumen firmer, but still it does not so alter the relation of the elements in meat, as to diminish its nutritious qualities.

\* *Kreatine*, from *κρέας*, *flesh*, a colourless crystalline substance, said by Liebig to be produced only from the muscular parts of animals.

† *Osmazome*,—*οσμή*, *a scent*, and *ζωμὸς*, *soup*,—an extractive matter which imparts the flavour and the savoury smell to cooked meat.

From Liebig, we learn, that the best method of boiling meat, so as to preserve its juices, and thus secure its tenderness, without diminishing its nutrient qualities, is to introduce the meat when the water is boiling briskly, then to keep it boiling for some minutes, and then to add cold water, so as to reduce the temperature of the water to  $165^{\circ}$  or  $158^{\circ}$ . If it be kept at this temperature for some hours, the flesh will be best adapted for use, being juicy and digestible.

Hard water is most suitable for boiling meat, because it more readily produces a layer of coagulated albumen on the surface, which prevents the escape of the juices, and preserves the fibre in a softer, more soluble, tasty, and nutritious state. But soft, or even distilled water, is best for the formation of soups, broths, and jellies.

*Vegetables* should be simmered rather than boiled, so as to be perfectly softened throughout, but in no part quite dissolved. Potatoes are most wholesome when so dressed, as to be neither waxy, nor mealy; this is best accomplished by keeping them in water ten or twelve degrees below the boiling point, until they adhere to a fork thrust into them, and then the water should be poured off, and the potatoes covered with a cloth, so as to allow the steam somewhat to escape, without much lowering the temperature until taken to the table.

*Roasting and broiling* tend to dry the meat, and melt out the fat, but they retain most of the juices, and therefore, viands thus cooked, are more savoury,

though, perhaps, not quite so digestible as well-boiled meat.

*Baking*, or that combination of boiling and roasting which may be easily managed in a good domestic oven, is certainly the most economical, the least troublesome, and the most useful mode of preparing nearly every kind of food. There are prejudices against this mode, arising from mismanagement and inattention to the requisites for baking well. The object to be aimed at is, to render the substance cooked tender and sapid, without causing any decomposition or waste. If the heat be properly regulated, this is infallibly accomplished in an oven properly attended to, and kept perfectly clean. There should be no boiling-over of gravy; and a little common sense will prevent this, by proportioning the dish to the fluid likely to flow into it from the meat or other substance to be dressed; but that stupid contrivance, the inverted cup, only increases the tendency to boil over; the air within it expanding by the heat, of course the cup contains no juice or gravy within it, until the dish begins to cool, and a stone, the size of the cup, would be about as sensible a thing, stuck in the midst of a pie in baking. If the heat be too great, as it nearly always is in an ill-managed oven, of course the fat is sure to be decomposed, producing that disagreeable and injurious *empyreuma*, which alike disgusts the palate, and impedes digestion. By slightly covering the substance baking, so as to prevent scorching and drying, while the fumes are allowed to escape, all the advantages of cooking may be secured, for then all the nutritious particles

of the food are preserved ; and by proportioning the time, and regulating the heat, we obtain the flavour of roast-meat, combined with the tenderness of meat most judiciously boiled.

*Stews* are objectionable, as they cause a degree of decomposition, especially of the fat and gelatine employed in them, and are therefore very apt to disturb a weak stomach. Stews have, moreover, the disadvantage of being too fluid, and they cannot be digested until much of their watery parts be absorbed by the stomach.

*Frying* combines all the disadvantages of too high a temperature, and the necessity of using much oily matter, which, from this process, must soon become rancid, and render whatever is mixed with it quite unfit for any but the strongest stomach.

The intentions of cooking are five-fold—to soften the food, to elicit its qualities, to render it fit to be readily mixed with the gastric juice, to diversify the diet, and to refine the enjoyment of a necessity. The digestion of our food is facilitated pretty nearly in proportion as these objects are combined, provided, of course, that there is nothing added directly prejudicial to the vital processes. Tasteless things are usually ill adapted to the stomach, but it must be remembered that the habit of taking seasoned dishes begets a false taste, and prevents our perceiving and enjoying the flavour of the less sapid substances. Things that are obstinate in the mouth will be equally so in the stomach, and a junk of salt beef, a hard dumpling, or a dense crust, are as difficult to digest as to chew : and even an egg, which, when taken in

a liquid and raw state is easily digested, is very slowly digested when boiled hard. Yet we are not to suppose that food dissolved before it is taken is always good for the stomach,—so far from that, we find soups and broth often productive of uneasiness, probably because they are too liquid, and are swallowed without a due admixture of saliva, for when taken with a proper proportion of bread, they are not only wholesome, but sometimes peculiarly beneficial, especially to aged persons.

*Condiments* may be either aids or impediments to digestion. The most important condiment is common salt, and, indeed, it seems essential to the higher forms of animal organism, and cannot be dispensed with but to the detriment of life. According to the ancient laws of Holland, great criminals were fed on bread without salt, and the effect was to encourage a horrible multiplication of intestinal worms, that destroyed their victims in a most excruciating manner. Salt is requisite for the digestion of vegetable substances, and without its introduction to the system in some manner with the food, the gastric juice cannot be perfect, and the secretion of bile would be incomplete, since the hydrochloric acid of the salt is required in the former, and its soda in the latter. A little salt seems to expedite the admission of nourishment to the body, and from experience I can state, that a glass of milk and water, with a small tea-spoonful of salt, is the best refreshment that a fatigued or famished person can take.

“ M. Plouviez recently presented a memoir to the Academy of Medicine in Paris, detailing the results

of a series of experiments he has been engaged upon, with a view of determining the part which salt plays in alimentation. To ensure accuracy, he had to make choice of persons who led regular lives, continued their habitual mode of alimentation, took the salt at a meal it is not usually taken at, viz., in the morning (with milk), and were weighed before, after, and during the intervals of the experiments. He found more than 25 persons who fulfilled these conditions; but he does not detail the experiments made upon these, as the results only differed in some shades from those observed upon himself. Some of the persons experimented upon increased in weight, from 500 to 2500 grammes (the gramme is about 15 grains English,) in 30 days, and that only from the daily use of from six to ten grammes of salt. Others increased from 5,000 to 10,000 grammes in three or four months. Some acquired more strength and vigour, without any of the inconveniences of excess of nutrition; while others suffered from all the inconveniences of excess of plethora, until the regimen was changed. The nutritive power of salt was always most observable in feeble lymphatic subjects. The experiments would at first seem to support the opinion of those who state, that one pound of salt will produce ten pounds of flesh; but if the regimen is continued from five to ten months, or more, the progressive increase of weight is no longer observed, a stationary condition ensuing, the blood being now as rich, and nutrition as complete as possible. This fact explains the opposite conclusions arrived at by different observers. The

appetite is sometimes found to increase during the first eight or ten days, then to resume its normal condition, and after the first or second month to diminish. The most general and certain effect is the increase of the strength; heat is more readily generated, and the exposure to cold better borne."—(*British and Foreign Medico-Chirurgical Review*, Jan. 1850.)

*Acids*, such as lemon-juice and vinegar, not only stimulate the salivary glands and the stomach, but in small quantities promote the conversion of glutinous and fibrinous substances into chyle, by exciting a direct digestive fermentation. In large quantities, acid condiments are highly injurious, in consequence of their favouring the excessive action of oxygen on the tissues, thus producing extreme leanness, and sometimes even destroying the substance of the stomach.

The *spicy condiments* are useful only where an atony or want of power exists in the stomach and bowels, as in some forms of diarrhoea and constipation; but they are also apt to produce this state by their habitual and too abundant employment, on the same principle that the abuse of stimulants deadens natural sensibility, and weakens all the nerves. They are used with most advantage in those climates which produce them, and where farinaceous food is the chief aliment. They may be taken with great freedom where the skin is excited by a high temperature, especially as adjuncts to gourd-fruits, such as cucumbers and melons. Animal food never needs spice, or if it does, it can only be

to disguise what is not fit to be eaten, as in sausages and mince-pies. Some kind of bitter exists, conjoined with some aromatic, in the food of all herb-eating animals, and is too generally absent from our refined aliment. To supply this, instinct as well as reason prompts us to seek beverages that contain something of this kind, as in our malt liquor flavoured with hop. It is, however, questionable whether the hop is the best thing for the purpose, and it is certain that a fermented fluid is not always the best vehicle either of the bitter or the aromatic. Many robust men and women among our peasantry, from notions of their own, use infusions of balm, sage, and even, sometimes, a little rue and wild thyme, as a common drink, with satisfaction to their stomachs, and advantage to their health. The semi-civilized inhabitants of northern countries are generally in the habit of using bitter drinks; and even in the coldest habitable climes, the Iceland and other lichens afford the natives a wholesome and very bitter addition to their highly animalized food, and, at the same time, a medicine of great virtue. All the spicy bitters contain large proportions of carbon and hydrogen, and chemically tend to promote the action of the lungs and the excretory organs. Mustard, onions, leeks, and all the cruciferous plants, contain also nitrogen and sulphur, and they act favourably on the kidneys and skin, as well as the bowels, and probably furnish materials that encourage the development of certain parts of the body, and promote the growth of the hair.

*The manner of eating* demands attention in con-

nexion with the preparation of food, for we have to consider what is to be done before the food can be quite fit to enter the stomach. Why have we cutters and grinders in our mouths? and why does a savoury morsel, or even the idea of a dainty, produce a flow of saliva when the stomach is prepared for a new supply? Why, it is evident that food is to be chewed. Several purposes are answered by this process: the saliva contains ingredients of value in digestion, and a certain proportion of air is to be blended with the food, and it is an important office of the saliva and other fluids generated in the mouth to entangle the air in the act of chewing, while each morsel is to be reduced to small fragments, and be formed into a pulpy ball convenient to swallow. To gulp down a meal in a hurried manner deprives the stomach of these advantages, and is unnatural to man, except when his appetite masters his reason. Hasty swallowing is always attended with some violence to the nerves about the entrance to the stomach, and the habit, therefore, irritates the heart, and is apt to produce disorder of the brain. Solid substances require to be masticated, in order to prepare the nerves of the gullet and stomach for that spontaneous action which renders swallowing a perfectly safe, regular, and pleasant action. Besides, those who devour their food are apt to treat the stomach as if it were a dead receptacle for all they may please to drop into it, and they swallow in their hurry, with a *gusto*, much that they could not hold in their mouths without inconvenience or disgust.

But the stomach is, in reality, more sensitive than the palate, and immediately becomes disordered by whatever would be too hot, cold, or strong, to be comfortably detained awhile in the mouth. A fierce appetite should, therefore, be slowly appeased. We should deliberately enjoy the blessing of taste and flavour, or we shall be in danger not only of over-loading the stomach before the appetite is satisfied, and thus producing *malaise*, but we shall be ravenous in our indulgence, and take delight in the quantity, while we lose all delicacy of perception as to the *quality* of our aliment. Even an epicure is, on the whole, more respectable than a glutton, inasmuch as one who thinks of his pleasures is more amenable to reason than one who only aims at satisfying his appetite.

In connexion with the preparation of food and the manner of eating, a few words may be admitted concerning the care of the teeth.

Though it would appear that the teeth are rather more essential to good pronunciation than to good digestion, since many have attained a healthy old age without teeth, yet they are certainly intended to grind the food, and would be worth preserving for their mechanical uses, irrespective of the desirableness of avoiding offensive breath and the dire pangs of a carious molar.

1. Keep the teeth clean with a stiff brush and powdered chalk, with about a twentieth part of powdered myrrh, and a very little camphor.

2. Thoroughly cleanse the mouth with water after

every meal, because any substance that decays in contact with the teeth produces lactic and other acids that corrode the enamel.

3. Avoid lozenges of all kinds, whether of gum or sugar, for gum is speedily converted into grape-sugar by the saliva, and this sugar is more destructive to the teeth than any other. All sweet things are instantly converted into an acid by the presence of decaying animal matter, such as the fibres of meat often detained between the teeth. A carious tooth has the same effect upon all sweets.

4. Keep the stomach in a good state by moderate and unstimulating diet, for the secretions of the mouth are generally in sympathy with the stomach. Take a dose of cold water, with a little lemon juice, and reduce your diet a little, whenever you experience a bad taste in your mouth, and require no active medicine.

5. Never take medicines of an active kind, especially mercurials, unless some judicious medical practitioner directs and watches it. The bad teeth of this generation are probably caused by the mercurial quackeries and hot sweet slops, so fashionable for the last fifty or sixty years.

6. If the gums become spongy, or detached from the necks of the teeth, your diet is probably defective, and more fresh vegetable is demanded. Lance the gums, however, and let them bleed freely, and gargle the mouth with alum and water, or strong sage-tea unsweetened; but the best application to spongy gums, and in case of salivation, is pure tannin, or, as a substitute, tincture of galls.

7. To remove tartar, use a mixture of sal-ammoniac, common salt, and burnt alum, as a tooth powder, with a strong brush; and if you cannot thus remove the tartar after using the powder twice a day for a few days, apply to the dentist, for an accumulation of tartar is sure to destroy the teeth. This, however, may usually be prevented by an unstimulating diet, abundant exercise in the air, and the use of good water, observing the rules just given.

## CHAPTER VIII.

### BEVERAGE.

“Learn temperance, friends, and hear, without disdain,  
The choice of water.”

WHEN we consider that nine-tenths of our food consist of fluid, and that every drop of fluid taken into the stomach must be conveyed into the blood, and be conducted into every part of the body before it is naturally removed from the system, the importance of our drink will be sufficiently evident. When, moreover, we reflect on the fact, that pure water alone is the proper solvent of nutritious substances, and that whatever is added to the water we drink has a direct effect on the chemical processes of digestion and of life, we shall perceive how careful we ought to be in our choice of fluids.

Whatever is admitted into the blood must be first dissolved in water, and when thus admitted, it acts not only on the blood, but also on the minutest parts of the organization wherever the blood flows, so that the whole body is influenced in every atom by the

nature of our beverage. We all feel the influence of a stimulant almost instantly on its being swallowed, in consequence of its direct effect on the nerves of the stomach, and thence on the brain ; but stimulants have another effect in the course of circulating in the blood. Physiologists have proved by experiments that stimulating substances being injected into the veins invariably produce a dilatation of the capillary vessels, by diminishing their vitality, which of course is immediately followed by an accumulation of blood in those vessels, terminating speedily either in some disturbance of function, some permanent stoppage, or some degree of inflammation there. Hence the congestions of the drunkard, the permanent debility of his brain, his liability to disorders of the intestines, his thickened stomach, his hardened liver, and his coarse distempered skin and bad disposition. I apply the term drunkard to any one who from habit resorts to stimulants of any kind to keep up a false sense of vigour. Such a person, though, perhaps, never quite intoxicated, is thoroughly diseased, and under the dominion of a depraved appetite, which is not to be cured without especial grace, and a decision of character that will at once defy the tempter to his face.

“ We curse not wine ; the vile excess we blame.”

There cannot be a more striking demonstration of the evil effects produced on the vital economy by the habitual use of alcoholic fluids than the occasional occurrence of what is called spontaneous combustion of the body. The combustion, however,

is not spontaneous, but it results from the greater inflammability of the structure, in consequence of its surcharge with hydrogen and carbon; the body, under such circumstances, readily taking fire from the contact of a burning substance, and consuming to ashes in a few minutes. The peculiar liability of brewers' draymen to attacks of destructive erysipelas arises from some similar state of body, and is clearly the consequence of habitually taking an immense quantity of beer, often as much as six quarts a day, a quantity of fluid sufficient of itself to produce mischief, irrespective of the spirit and carbonic acid contained in it. That it is what the water conveys into the blood-vessels, however, that mainly disturbs the equilibrium between waste and supply, I learn from the experience of a thin and active hydropathic hypochondriac who, at a neighbouring pump, fills his half-pint mug, and empties it into his stomach about forty times a day! Water-drinking intemperance is certainly the safest to a man who sufficiently secretes, but the man who thinks he needs to flood all his functions in order to keep them in health, is as much subject to excess as the tippler, and that although cold water be his only stimulant.

There are but four sufficient reasons for taking stimulant beverages:—

1. A constitution which would become scrofulous without it. This is rare.
2. Recovery from exhausting illness, in which there might sometimes be risk or delay of improvement, without such aid to the functions.
3. A loss of general tone from great mental de-

pression, or from extreme exhaustion. Wine is good for those of a sad heart, and strong drink for him who is ready to perish, says Solomon.

4. The necessity of an unusual effort of mind or body may demand extra stimulation. We should, however, remember that stimulation, if continued, becomes a direct source of exhaustion, and therefore it can be useful only on particular occasions, just as the bellows may be occasionally employed to kindle a neglected fire. What should we say of the management in a house where the kitchen fire was always kept to the needed height by the use of the bellows? The object in our economy is to maintain a steady fire, neither too rapid nor too slow, and that is best effected by proportioning the supplies of food, or fuel, to the quantity consumed, which is determined by the degree of cold, the amount of exercise, and the quantity of air breathed in a given time.

The comparison between the bellows and the stimulant is, however, not quite correct, since in fact to take alcoholic drink unnecessarily is rather like smothering a fire with coals, while the fire, to perform its office fully, requires to be steadily and slowly supplied with fuel and kept clear, that the vital air may act regularly and equally throughout, just as it does on all the body, if not disturbed by an unnecessary and sudden supply of carbon and hydrogen.

The readiness with which the fuel of the system is supplied by spirits, is the cause of their value in great sinking of the vital powers, and also of their

injurious influence when the system is vigorous, and well furnished with nutriment.

Aleoholic fluids put a stop for a time to the proper metamorphoses of the tissues, and supply the elements of respiration, which should be furnished by the body itself. They, therefore, lower the vital powers, if improperly employed, and may quench life. Such stimulants are never safely given *merely* for the purpose of keeping up the temperature of the body, except in extreme cases; since, as long as it is possible to take exercise and digest a sufficiency of food, nothing more is needed to sustain the temperature of the body in any climate than proper food, good water and warm clothing. Liebig does not speak like a pathologist, when he classes brandy with train-oil and tallow-candles, as a means of maintaining the flame of life in cold climates; or he forgets that the oil and the grease are not direct stimulants, and that they furnish those who can digest them with fuel that does not cause the whole system suddenly to flame up, to its great risk, as often as they are used.

The fact that the American whalers have nearly driven ours out of the Arctic regions on total abstinence principles, they taking no fermented or spirituous liquors, while ours use an abundance of such things, is a proof that the habitual consumption of alcoholic drinks does more harm than good in those regions, as well as everywhere else. Nevertheless, such things are often very convenient aids when the body is not sufficiently nourished; and there can be no doubt that scurvy is more likely to occur among

a crew badly provisioned if they are also deprived of beer and spirits.

Even when direct stimulation is most frequently resorted to, as in fatigue, it is evident that in most cases the more natural and salutary plan would be quietly to rest, and wait for the far better refreshment which follows sleep and the assimilation of a temperate meal.

All the living waters of the earth seem to assure us, that it was the Creator who exclaimed, *Whosoever will, let him take of the water of life freely*, for there is no limit to the liberality of Heaven; and water, as the vehicle of life to all living things, is the proper symbol of God's own generosity.

Water is, indeed, the natural source of all nourishment, and without it not a single process of creation is carried on—it is as essential to life as the universal light and the genial warmth of Heaven, and it is, in fact, "the chief ingredient in Heaven's various works."

By the wonderful combination of agencies that preserve the balance between all animate and inanimate things, a certain quantity of water is always suspended in the atmosphere, ready to be distilled upon the bosom of the earth, and always more readily and freely upon those parts which by their elevation or position would best contribute to the wide distribution of living streams for the use of man and beast, and the various tribes of vegetable being. By this means, also, the essential fluid is furnished in its purest state, for usually, as found in rivers, it contains nothing prejudicial to life, and the

more nearly it resembles rain-water the better, for this, beyond comparison, is the best for the promotion of digestion and for all the purposes for which water is demanded.

Good river-water contains about three per cent. of its bulk of atmospheric air, or rather air having a slightly greater proportion of oxygen, and this affords a test of its purity. As water becomes impure it loses the free oxygen naturally contained in it. Thus, in the water of the Thames, near London Bridge, oxygen cannot be detected—phosphuretted hydrogen standing over a quantity of it does not lose its combustibility, and the phosphorus is not oxidized as it would be by standing over pure river water. The rivers of mountainous countries are generally purer than those of champaigns; the water of the Leven, a tributary of the Clyde, contains only 3.75 grains of solid ingredients in a gallon, according to Dr. Penny, while that of the Thames, even at Teddington, contains 13.86, and at London Bridge no less than 28.035. The water of mountain lakes is even purer still, from the circumstance of their allowing the subsidence of impurities; the water of the Bala Lake, in North Wales, for instance, contains only one grain of earthy matter in a gallon. The water of ponds is very different, and usually holds more impurity in solution than the Thames at Greenwich.

*Hard water* is commonly unfavourable to health, as it holds in solution much mineral that diminishes its solvent action, and is not unfrequently injurious to the blood. The lower animals prefer soft water,

and if confined to that which is hard, they soon become diseased in the skin, stomach, spleen, and intestines; and man is just as obnoxious to these ill effects, and often experiences them.

The water from superficial wells, especially about London, is hard; the deep, or Artesian wells, however, furnish water of a soft character, from the quantity of soda it contains; it holds in it, indeed, much more mineral matter than almost any river-water. Thus, the water of the well in Trafalgar Square contains 68.239 grains of mineral substance in a gallon, and that of Lambeth workhouse, from a shallow well, has but little more—69.051 in the same quantity.

We must not overlook the fact, that the chief mineral found in water is usually either the sulphate or the bicarbonate of lime; and lime, we know, is a necessary ingredient in our bodies. It usually exists as a bicarbonate in river-water, and it was proposed by Dr. Clarke to precipitate the lime from the water supplied to London, by adding enough pure lime to convert the bicarbonate into a carbonate, which would slowly precipitate in the form of whiting. This would be an extensive tampering with a natural provision, and might be productive of equally extensive mischief among a multitude living so artificially as the inhabitants of London, whose food is probably of a kind ill calculated to enable them to dispense with the lime which Providence sends them in the water; and, besides, it would not improve the water for laundry purposes, since it is always boiled for washing, and boiling effects the Doctor's object

better than added lime. Very hard water, however, and also such as contains much vegetable impurity, I have frequently found to be rendered quite wholesome by the addition of about twenty grains of *pure fresh lime* to every gallon, stirring it well, and then filtering it, or allowing it to stand until perfectly clear. *Carbonate of soda* softens the well-water of most soils; it throws down chalk when the water contains the bicarbonate of lime or the sulphate, and a carbonate of magnesia when the chloride of magnesium is present. Of course the effect results from the union of the carbonic acid of the soda with the bases precipitated, and therefore the cleared water will hold sulphate of soda and chloride of sodium in solution. *Oxalate of potash*, as proposed and patented by Mr. Horsley, decomposes all the earthy salts on which the hardness of water usually depends, but it cannot be generally applicable, although very efficient in competent hands. Supposing the hardness of the water to be owing to the bicarbonate and sulphate of lime, by the addition of oxalate of potash, an insoluble oxalate of lime is precipitated, while bicarbonate and sulphate of potash are held in solution.

Stagnant water is apt to beget dysentery and ague, probably from being impregnated with poisonous gases, and certain peculiar acids, the nature of which is not well understood, chiefly from the decomposition of cryptogamic and microscopic vegetation. Alkalies and boiling render such water less unwholesome; and it is said that astringent bitters, such as the bark of the willow and the Peruvian bark, not

only cure ague, but also the water that causes it. The presence of trees diminishes *malaria*, and prevents the water near their roots from becoming putrid; and cleared countries, if not well drained, are far more subject to intermittent diseases than those that are full of forest. Here I would incidentally observe, that bitters are more relished and more useful in marshy districts than in those more salubrious. The poor on the coast of Sussex use a strong infusion of that excellent bitter, the lesser centaury, with success, in brow-ague, and the intermittent headache, so common among them.

The putrid matter held in solution by stagnant water acts perhaps as a specific ferment, which propagates itself under favourable circumstances; and, from analogy, it is not unlikely that certain vegetable principles, such as the bitter alkaloids, Quina, &c., may arrest this ferment both in the body and out of it, just as the fermentation of yeast in beer is arrested at a certain point by the hop and other bitters, or by the addition of a sulphate.

Moses was divinely directed to cast a tree into the well, which the Israelites found too impure to drink (Exod. xv. 25.) There was a natural fitness in that tree for the purpose, or it would not have been selected. Might it not have been burnt, and so cast into the water? Charcoal alone removes putrescence from water, but the ashes of a tree would also contain carbonate of potash, which would improve water holding bicarbonate of lime and chloride of magnesia in solution, by throwing down a precipitate of chalk and carbonate of magnesia, the alkali

taking their place in the water, and making it soft and comparatively palatable. In the Tabeef Shereef, or *materia medica* of India, it is said that if the bark of the tree known in Persia as Lirzan, and in India as Peepul—*Ficus Religiosa*, be burnt and thrown into water, it quickly purifies it.

When gelatinous substances from animal bodies, or from the decay of conferval vegetation exist in water, they tend to prevent the subsidence of any earthy matter mixed with the water, and in that case the addition of an astringent bark or fruit will clear it. Alum, also, has a similar effect.

Water may also be cleared of suspended impurities by pounded seeds, which contain albumen. In this way the Egyptians clarify the muddy waters of the Nile, by smearing the inside of their water-jars with a paste made of almonds. It seems to act much in the same manner that white of egg and blood act in purifying sugar, by entangling the impurities. With us, all such methods are superseded by the use of the filter.

*Filtration* naturally suggests itself as the readiest method of separating impurities suspended in water. Sand and gravel, and porous earth and stone, are the evident materials through which the water of our springs is filtered; and, by experiment, it is proved that the passage of water through a large quantity of sand, not only removes what was *mixed* with the water, but also some of the ingredients *dissolved* in it. The attraction of adhesion, capillary attraction, is sufficient sometimes to overcome chemical affinity. *Animal charcoal* is remarkable for its power in remov-

ing not only suspended impurities, but even noxious odour, colouring matter, and many other things, from their solution. Hence, it has been conjoined with sponge and sand in forming filters, but although perfectly efficient at first, it is found that, by constant use for a few days, the quality of the charcoal becomes impaired, and it requires renewal at least once a week, in order to preserve the purifying power of the filter. Boiling improves almost every kind of water, but boiled water should be agitated in the air when cold, that it may regain the oxygen it has lost.

*The preservation of water* is best effected by keeping it in closed iron vessels. Water exposed to the air, especially in summer, gets loaded with microscopic fungoids and animalcules, which do no harm while alive, but cause putrescence by their death and decay.

We should imitate the ancients in our concern to obtain pure water, for we have abundant evidence that the most prolific source of disease, next to bad air, is bad water. Whenever it contains animal or vegetable matter in a state of decay, or minerals prejudicial to the blood, such as lead, it should be shunned as the direct instrument of death, instead of being, as intended, the essential vehicle of life.

*The quantity* of fluid it may be proper to take, will depend on circumstances. A man who is strong, and fully employed, will require from three to four pints of drink a day in dry weather. In general, even less than this is desirable in a climate like ours. Every drop of water more than enough for digestion

increases the demand upon the vital energy, and facilitates waste of the body. Hence, if a man take a large quantity of water with a small quantity of food, he will become thin more rapidly than with the same quantity of food, and a proportionate supply of water; an excess of water, in fact, facilitating the action of the air upon the substance of the body, and so far in its effects resembling abstinence, and leading directly to impoverishment of blood, as we see in the *crisis* of the water-treatment.

A draught of cold water will sometimes stop digestion, and sometimes expedite it, according to the state of the stomach at the time. The stimulus of cold will excite the secretion of gastric juice, if the nervous system be not exhausted, and actual thirst may always be safely met by a moderate draught of water at a temperate degree. As, however, digestion is effected by the action of a solvent, to dilute this solvent is, of course, so far to diminish its direct action, and therefore, as a rule, no more fluid should be taken with a meal than will suffice to facilitate proper mastication. Those who indulge largely in warm drinks, especially strong tea and coffee, are peculiarly liable to disorders of the stomach, and to all those anomalous nervous distresses and excitements which arise from impure blood; but a moderate use of those fluids, when not too strong, or too warm, is certainly in most cases favourable to the health, but of those especially whose employment is sedentary, or not very laborious, and who therefore do not require a full animal diet.

*Tea* and *coffee* contain principles highly conducive

to the vigorous action of the brain (theine and caffeine), and we ought to be thankful to Providence for those excellent productions, by the use of which the commerce of the world is so greatly promoted, intellectual cultivation advanced, sociality refined, and the intoxicating chalice banished from our boards.

Nevertheless, I am inclined to think with many rustical old ladies, whose wisdom is founded upon experience, that sage-tea is often superior in its effects upon both the stomach and the brain to either the infusion of the Chinese herb, or the decoction of the roasted berry. It is, however, unknown in fashionable circles, and science has neglected it; but still it deserves attention, for it contains just that combination of bitter with aromatic, which would justify the praises bestowed upon it by the ancients. Thorough dyspeptics, however, generally find cocoa made from the nib sufficiently agreeable to the taste, and not unfavourable to digestion. Toast-water, prepared from hard biscuit, reduced by fire to a coffee colour, according to the direction of Sir A. Carlisle, is a wholesome and agreeable beverage. It should be prepared by pouring boiling water upon it, and drank as soon as sufficiently cool, as all such infusions become mawkish if kept beyond two or three hours. But however advisable certain medicated drinks may be for invalids, we may still conclude with the poet, that—

“ Nothing like simple element dilutes  
The food, or gives the chyle so soon to flow—  
What least of foreign principles partakes  
Is best.”—ARMSTRONG.

## CHAPTER IX.

### MENTAL INFLUENCE.

THE most inscrutable agency is that of the mind. Hope and fear are the master motives of our being, and during our waking hours they may be said always to be present with us. They lead us along the path of life in safety between them, but if either be absent only for a moment, the influence of the other becomes so intense, that we are instantly like maniacs walking on the brink of an abyss, with all our blood at war with our nerves, and every fibre of our muscles strained almost to destruction. Hope, without a qualifying apprehension, is a delirious joy, which as thoroughly intoxicates the brain as would a full dose of Indian hemp or a bumper of brandy; and many men are permanent lunatics from their inability sufficiently to fear any evil consequences from their bad habits and indulgences. Thousands are kept in a diseased state by daily persuading themselves that what they like will do them no harm: thus, the dram-drinker goes on with his fillips till gay hope suddenly vanishes, and he dies in his trembling mad-

ness ; thus, too, the debauchee lives merrily in his lusts, while unmindful of the final reckoning, and for awhile he may seem uninjured, as a raving maniac seems strong in spite of his sleeplessness, but let a little of the sober truth be felt in some tranquil hour,

“ And he will look as hollow as a ghost ;  
As dim and meagre as an ague fit ;  
And so he'll die.”

That medicine must be admirably adapted to the case which will cure without hope, and that must be highly pernicious which does not speedily work wonders, if taken with a full persuasion and expectation of rapid benefit. In this respect, there is, perchance, some advantage in the boldness of ignorance on one hand, and of imposition on the other ; and when the means employed are moderately reasonable, the enthusiasm of professors most extravagant in promise, when practising on patients equally extravagant in hope, will sometimes result in the miracles of healing which we read of in advertisements. But, alas, how often have we seen the maladies reported quite cured at Graftenburg or Matlock, come back, with all their virulence, on the return of the patient to his cares. The invalid that withstood the diet of the strong-souled German peasant, when pursuing health in company with laughing Hope upon the hills, is sickened and distressed by every morsel taken in the city ; and the man of speculation finds even the pleasant faces of his wife and children at his Sunday's dinner scarcely sufficiently cordial to counteract the dyspeptic influ-

ence of his anxiety to provide for their comfort, and his own pride.

*“Ubi vehementi magis est percussa metū mens  
Concentire animam totam per membra videmus.”*

To avoid the intoxicating effects of inordinate wishes and hopes, on the one hand, and the chilling, paralysing influence of a too familiar fear on the other, let us study to understand our position, and knowing that we are really and fully provided for by the Dweller in eternity, we may well assure ourselves that the use of means in humble reliance upon His hand will be blessed according to the purposes of the wisest will. Whether we consider those means in reference to the daily supply made to meet our wants in health, or in reference to what may be needed in our sickness, it is evident that the Power we are called upon to trust, works not on partial principles, but requires us all to walk with caution in that moderate and middle course in which hope and fear shall act but as equal forces to preserve all our powers of mind and body in order, and to facilitate our passage into the land where health can never fail.

The strong wind is as necessary as the calm sunshine; we are all unavoidably more or less subjected to the excitements of some degree of anger and of apprehension, and without them our earthly existence would be as dull and monotonous as a sea without a wave. These emotions rouse the heart to action; anger kindling the system with a desire and a power of active resistance to anything that offends

us; while apprehension stimulates us to consider the means of avoiding whatever may threaten to injure us or those we love. Excessive or unreasonable anger carries this rousing power so far as to endanger the heart, the brain, and the bloodvessels. A fulness of the vessels, especially from too abundant a use of animal food, presents the physical condition most favourable to excessive excitement of all the passions, and a choleric temper is so apt to accompany the training of the physical system to its highest development, as among prize-fighters, and certain savages, such as the New Zealanders were, that their sportive battles would always terminate in real fighting, but for the restraints put upon their passions by the presence of others. In short, when most disposed to anger, if not otherwise diseased, we can best bear fasting, and really most need it; and therefore if

“Your wrathful blood is apt to boil,  
Wave all dispute; be cautious if you joke,  
Keep Lent for ever, and forswear the bowl.”

Anger, when conjoined with fulness of blood, is very readily followed by inflammation in the capillary vessels; hence, the gouty and the irascible habits are so frequently associated. The case of Alexis Martin is well known, and often quoted; an opening was made into his stomach by a gun-shot wound, which so healed that the interior could be seen, and thus by direct observation Dr. Beaumont proved that anger excites an inflammatory state of that important organ. Every one has felt somewhat of the influence of anger in disturbing di-

gestion and disordering the blood, increasing the flow of bile, and irritating the heart and brain. It hurries the consumption of carbon, quickens the action of the lungs, and rapidly exhausts the nerves and muscular force, and more than any other emotion tends to establish a disordered state of the circulation. Fear and anxiety diminish the action of the lungs, impede the changes amongst the ultimate molecules of our bodies, interrupt all the secretions except that of water, and produce a cold, harsh, and pallid state of the skin. The genial passions, however, operate in a manner quite the reverse, and a man whose affections are in a prosperous condition, has rarely occasion to complain of functional inactivity. The chronic passions predispose to chronic maladies, by promoting congestions of the viscera, and persons thus afflicted are the first to suffer from indigestion, intermittent disease, and cholera, while those who suffer from violent emotions are more liable to acute inflammatory diseases. But all our emotions are capable of destroying life if carried to excess, and therefore they all, more or less, interfere with the proper action of that centre of sympathy, the stomach, by accumulating irritability in the brain, while diminishing the energy of that nerve-action by which the organic functions are carried on. In short, if the emotions proceed beyond that healthy stimulation which excites to comfortable activity, for the good of our homes and our hearts, they result in exactly that effect upon the brain and the nerves which alcohol and other poisons are apt to produce when habitually taken; and it is as vain for a man

subject to inordinate affections to expect a regular appetite, a good digestion, healthy blood, and a clear intellect, as for a gin-drinker to expect to appear wholesome.

“It is not Thought, (for still the soul’s employed,)  
'Tis painful thinking that corrodes our clay.  
Hence the lean gloom that melancholy wears ;  
The lover’s paleness ; and the sallow hue  
Of envy, jealousy ; the meagre stare  
Of sore revenge : the cankered body hence  
Betrays each fretful motion of the mind.”

Fatigue, whether from thinking, action, or emotion, always weakens the brain, and disturbs the digestive powers of the stomach, and delays secretion, and therefore all invalids should recline for some time immediately before their meals, provided the previous amount of exercise has been sufficient to demand rest. A weakly person may, however, readily mistake listlessness for fatigue, and thus be afraid of that exercise which would be most restorative of his powers. A fatigued nerve always aches, and aching nerves always produce intolerance of action and irritability of temper, and therefore all effort should be avoided on the approach of exhaustion. Great mental agitation and prolonged effort of the will, operate on the blood-vessels, through the nerves, much in the same manner that any other stimulant improperly administered would do ; at first exciting and then exhausting the vital energy, so that the result is much the same, an inanition and a corruption of the blood, which are not to be cured without proper dieting and a long rest of the brain and

nerves. The mind acts on the ultimate vessels in which the changes of the blood are effected. Who has not felt the flush of thought suffusing the cheek, quickening the heart, and kindling the eye? We all acknowledge, by the blushes of love, and pride, and shame, or by the cold and pallor of our fears, that the affections of the mind possess dominion in the citadel of life, and permanently influence the whole economy of our bodies; and thus we learn how it happens that physical influences disturb the mental functions, through the organism on which the mind itself operates, for it is manifest that as the mind is evinced only through the organization, whatever affects the one must influence the other also.

The fibrillæ, or terminal fibres of the nerves, are involved amongst the minute bloodvessels, and it is the office of the nerve-power to influence life and chemical action in those vessels; and here it is that mind, life, and chemistry, meet together, so that every change in the state of the feelings produces a corresponding change in the blood, and every change of the blood influences the mind. Thus, we find that the action of medicine is vastly modified by the state of the mind, and by the habitual activity of the brain, which in some measure accounts for the anomalies so often witnessed in the practice of physic, medicines in opposite states of feeling producing contrary effects on function.

We meet with many instructive instances, proving that mental influence may often be made available in the cure of disease, and indicating the importance of encouraging the mind, wherever it can be done

without trickery, that it may not disturb the vital functions by an intense attention to morbid impressions. A writer in the "British and Foreign Medical Review" (1847), among several other cases of a like kind, relates these:—"A very intelligent officer suffered for years from violent attacks of cramp in the stomach. Tonics, sedatives, opiates, &c., had been tried with but slight benefit. He was told by the relater, that there was a most effective but dangerous medicine, which should be given with his consent. This he readily gave. Accordingly, on the first attack after this, a powder containing four grains of *ground biscuit* was administered every seven minutes, while the greatest anxiety was expressed lest too much should be given. The fourth dose caused an entire cessation of pain; it had never been relieved before in less than three hours. In four subsequent attacks, the same remedy was attended with like success." But it may be said, this only shows that he did better without medicine than with—no uncommon thing. Let us see another case:—A seaman had suffered from attacks of constipation. The most powerful means were required for his relief. On a fifth attack he took two grains of bread-pill every seven minutes, much anxiety being expressed against an over-dose. He soon became violently sick, as had been expected, and the cure was complete. Cases of this kind might be multiplied *ad libitum*, but such instances are not needed to demonstrate that the feelings influence every fibre of our frame. The soul pervades every element of our bodies, and "in every nerve it thrills

with pleasure, or grows mad with pain." The direct influence of the immortal agent over the mortal organism, is beautifully demonstrated by the effects of emotion on secretion, and, perhaps, in no instance more remarkably, than when the mother's thoughts, being called to her infant by its cries, a more fervid stream of blood rushes to her bosom, and the needed nourishment is instantly generated for the eager babe. The functions connected with our appetites and passions, also become vigorous in proportion to the general supply of blood, and the degree in which our attention is directed to them; hence, to think of savoury food, excites the salivary glands and the secretions of the stomach, while an absorbing passion of the mind prevents all sense of hunger, and may lead to absolute starvation.

Those appetites which are not essential to the life of the individual, are so connected with the organic functions, as to be mainly dependent on mental associations for their activity, and they may be, and ought to be, so controlled by moral principle, by temperate diet, by right affection, and by regular employment, as to obtain no mastery over our higher faculties, but to act only as aids to the fuller development and invigoration both of our corporeal and intellectual natures. Probably there is no more effectual excitation to animal voluptuousness than an intense engagement of the mind in a sentimental working up of the intellect, for thus the brain is most highly stimulated, and that more especially as it is associated with the organization by which our sympathies are represented in the body;

hence great talent of the descriptive, showy, and exciting kind, both among writers and preachers, is often found in persons of the most degrading habits. Therefore be sober and vigilant, for in proportion to your sensibility to outward association, will be your danger from inward sensuality.

Abuse of the passions disturbs all the processes of life ; a brutal kind of indulgence may indeed be compatible with a brutal kind of vigour in those who are reckless, and living as if without care or conscience ; but a soul that condemns its own conduct, is sure to produce disorders of the nervous system, and hence also of the blood in all its vital operations. He who would have a healthy stomach, heart, and brain, must therefore cultivate a cheerful temper, and a vigorous habit of body, by engaging all his faculties on their right objects, according to the demands of social as well as individual interest, keeping the emotional nature in subjection to the moral, and behaving like one who knows his relation to heaven, his neighbour, and his home. “What shall harm you if ye be followers of them that do well ?” says the apostle, as if to teach us that there is but one cause of misery, disease, and death to man. Let us shun that, and we need not be very nice about the choice of our diet, or our doctor, for, after all, the grand secret of health is to be happy at heart, that is, to be actively obeying God. Do not say this is wandering from the subject: the rules of the New Testament are promotive of bodily health, as well as health of soul, and they are really sufficient in most cases for the direction of appetite in the use of

means, and in them we learn *why* we should be temperate, active, holy. As Dr. G. Cheyne says, "The love of God, as it is the sovereign remedy of all misery, so, in particular, it effectually prevents all the bodily disorders the passions introduce, by keeping the passions themselves within due bounds ; and by the unspeakable joy and perfect calm, serenity, and tranquillity it gives the mind, becomes the most powerful of all the means of health and long life."

## CHAPTER X.

### THE SYMPATHY BETWEEN THE SKIN AND INTERNAL ORGANS.

THE *liver, lungs, kidneys, and skin*, sympathise and intimately coöperate with each other, because they are all subsidiary to the grand object of removing the impurities of the blood, or keeping up the efflux of materials that have served their purpose.

*The healthy action of the skin* is very important to the comfort of every man; and perhaps there is no more common cause of stomach disorder than an excessive sensibility of the skin, induced by indulgence in bed, by warm rooms, by oppressive clothing, by too much thinking, by abuse of passion, by unsuitable food and drink, and by the neglect of cold water, which is alike valuable, as a means of purifying and invigorating the skin and the stomach.

The natural warmth of the body has been shown to depend on the action of oxygen on the substance of the body, and it is remarkable that this warming influence, an effect of the union of oxygen with the materials of the body, is greatest in those parts in

which the warmth is most needed, such as the skin. The outer skin is composed almost entirely of gelatine, which is an oxide of albumen; and it is the provision of nature to produce warmth in the skin, and vigour to the whole body, by every influence that shall determine the blood to the surface, which is abundantly supplied with appropriate vessels to promote the rapid change of the *epidermis*. Nothing can be more conducive to the invigoration of the skin, and its due oxidation, than daily washing the whole surface rapidly with water, followed by brisk friction with a coarse towel, and by exercise in proportion to the muscular power. Over and above the direct advantage to general health obtained by these means, there is a vast improvement in the feelings and temper, from the circumstance that the nerves of the skin are brought into vigorous action, for those nerves are the means by which we are most sensible of ourselves in connexion with the body. A man with a healthy skin feels sound all over, but a diseased skin constantly presents annoyance where we are most sensitive. The importance of a clean and healthy skin is seen when we reflect on its extensive influence, both as a surface from which perspiration is passing in a constant though often invisible stream, and also as a surface that imbibes much of whatever remains in contact with it, whether pure air or sordid materials. The skin, in fact, mainly regulates the balance between waste and supply, in relation to exercise and temperature. When we consider what is the function of the skin in respect to excretion, we see at once how greatly

its action must influence that of the lungs, kidneys, liver, and mucous lining of the whole interior. The perspiration yields nearly all the elements that are found in the urine—namely, ammonia, and various salts of lime, potash, soda, with carbonic acid and water, which exhale also from the lungs. But the most important office of the skin seems to be that of cooling the body by the large evaporation from its surface. Perspiration is not so much a secretion as a transudation, for the glands of the skin do not yield more than a sixth part of the total fluid exhaling from it. Valentin found that a healthy active man who consumed daily 40,000 grains of food and drink, lost 19,000 grains, or three and a half pounds from the skin and lungs; and he estimated that two and a half pounds passed by the skin. But experiments on this subject have been too much neglected to afford us all the information we need. Daily experience, however, confirms the opinion of Sanctorius as to the importance of the skin in maintaining the balance between all the functions of the body. But perhaps the most striking proof of its importance is the fact, that if the skin be covered with anything through which vapour cannot penetrate, such as a caoutchouc dress, the consequences are exactly similar to those of strangulation, and if a man were varnished all over, he would die with precisely the same state of blood as if he were hanged.

The absorbing power of the skin ought not to be overlooked, for we find that medicinal applications are imbibed, so as thus to produce all their effects,

such as vomiting by emetic tartar, purging by jalapine, salivation by mercury, and so forth. This absorbing power of the skin is modified by circumstances, and altogether arrested when the perspiration is abundant from a large supply of fluid, or from the warmth and the dryness of the air. If, however, the system be ill supplied with fluid, or exhausted by fatigue, it is exactly in the state most favourable to absorption, and hence it is that famished and weary persons are most liable to receive contagious diseases, and to suffer from exposure to malaria. We know from the experiments of M. Edwards, Abernethy, and many others, that the skin absorbs both water and gases, and of course, therefore, whatever morbid matter may be diffused in them. Hence we perceive the necessity of a clean skin and good dry air, and the propriety of fully supplying the body with nourishment, under circumstances that would otherwise cause the absorption of injurious materials.

Friction of the skin is more necessary than water for the preservation of its health and cleanliness. The Arabs, in the Great Desert of the Sahara, we are told by Richardson, succeed in purifying and invigorating their bodies by rubbing them with dry sand. The benefit of dry friction is shown in the effects of good grooming on horses. All animals naturally groom themselves, or each other, and it is quite a lesson to witness the grotesque and picturesque groups of cattle engaged in the mutual good office of currying each other. Many insects are provided with a natural comb and

brush on their feet for the purpose of keeping themselves clean. Cleanliness of the skin is the sign of health among all creatures in their natural state, and with man a feeble state is always associated with an ill-conditioned skin; it is therefore the more necessary for a person in such a state to use the proper means of encouraging the cutaneous circulation, as he thus not only increases his comfort, but really employs the likeliest means of improving the general health, and curing his malady. I dwell on the advantages of friction on the skin, because I know that in many cases the bath would neither be so convenient nor so useful. Water may be used to excess, but this cannot happen in using the flesh-brush, or the hair-glove, for wherever its use is appropriate, it can scarcely be too freely applied without giving sufficiently early warning. When the skin is in a thoroughly good condition, and the body altogether vigorous, it almost keeps itself clean. Mr. Walker, the ingenious author of "The Original," argued well in defence of the opinion, that a healthy state of the nerves and circulation produce a kind of vital emanation that repels dust and dirt from the surface. But however that may be, it is certainly a healthy thing, with the help of ablution, to keep the dust and dirt off our bodies, and besides—

"With this external virtue, age maintains  
A decent grace; without it youth and charms  
Are loathsome."

If the bowels are not daily relieved, the excretions from the skin are apt to become offensive; and the perspiration of a person whose digestive functions

are disordered by gluttony, or by improper food, or an excessive use of fermented fluids, exhales a vapour from the skin and lungs that rapidly renders the air surrounding him unfit to breathe; and, in fact, every disorder of secretion and excretion more or less influences the insensible perspiration, since whatever is not duly removed from the system by the lungs, or other channel of evacuation, is generally disposed of through the skin, if at all. One, therefore, who would enjoy and diffuse about him the pleasantness of health, will be cautious to employ all those appliances by which every function may be enabled to perform its part in the economy, and above all, he will avoid that redundancy of supply which burthens the whole system with a load of matter that cannot be properly concocted, but must be thrown off from the body in a corrupt, putrescent, and offensive state.

As it is through the skin that alterations of the air in respect to temperature, moisture, electricity, and pressure, chiefly act upon the body to disturb the vital functions, so it is also through the skin that internal disturbance is most generally relieved. The influence of such changes is determined by the habit and condition of the individual exposed to them. Thus one man gets catarrh from a chill, while another suffers from bilious disorder, or diarrhœa, and another from congestion of the lungs, the stomach, or the liver; but, whatever the nature of the functional derangement, it is never perfectly cured without the re-establishment of the action of the skin, and experience has taught mankind in all ages to promote

and encourage the efforts of nature to remedy the disorder by exciting perspiration.

Great injuries to the skin, as by burning or scalding, are not only followed by great disturbance of the nervous system from the direct shock, but they are often fatal, from their interference with the functions of the internal organs ; thus, severe burns often cause inflammation of the bowels and lungs, and, indeed, so great is the intimacy of reciprocal action between the skin and the vital functions generally, that a burn or scald, involving more than an eighth of the whole surface, is generally fatal, in consequence of the internal disorder thus set up. Eruptive diseases, too, are dangerous in proportion to their interference with transpiration.

When the skin does not dispose of the requisite quantity of carbonic acid and ammoniacal salts, and when the lungs and kidneys refuse to compensate for this, the liver is called to increased action to remove the accumulated carbon, by producing an extraordinary quantity of bile ; but if anything hinders the secretion of bile under these circumstances, very great febrile disorder is the result, as in yellow fever. The efforts of nature towards recovery in extreme cases, are attended with violent bilious disorder, vomiting, and perspiration, and it should be the object in their treatment to facilitate natural operations, chiefly by the external and internal use of water.

In all fevers and internal inflammations, determination to the skin is set up at intervals, as long as sufficient power continues in the system to effect

that object; and many such diseases reach their *crisis* in a violent perspiration, with sometimes an eruption, which at once relieves the more formidable symptoms. The treatment of the more decidedly intermittent forms of disease has been successful on the whole, in proportion to the means employed to fortify the system during the intervals free from increased action or fever, and in proportion to the power thus obtained of exciting perspiration on the returning hot fit; for the febrile reaction terminates the quicker and more complete the transpiration. Instinct, as well as reason, indicates the propriety of placing ourselves in a position calculated to restore the excretions from the surface, whenever, or by whatever cause, they may have been suppressed. We seek warmth, we cover ourselves with clothing, we retire to bed, we take warm demulcent fluids, or, if much fevered, we drink largely of cold water; or, it may be, with more decision, like the more instinctive and barbarous tribes, we resort to a warm bath in some form. The vapour bath is, probably, in such cases, the most efficacious, but any means by which the skin may be kept enveloped in moisture, and, at the same time, evaporation be prevented, as by the packing process of the hydropathists, will ordinarily be sufficient to produce a profuse perspiration, and thus to relieve the lungs, the liver, the kidneys, and the intestines, of the congestion that precedes or accompanies all febrile disease, from the plague to a common cold, and is indeed more or less present in nearly every functional malady.

Determination to the skin, however, seems not to

act simply by unloading the bloodvessels of materials that ought to be removed, but also by a counter action in which, perhaps, the forces that maintained the morbid state are, so to say, diverted. Thus, in many local affections, the efficiency of blistering or stimulating the skin with warm plasters, embrocations, and liniments, called rubefacients, from their reddening the skin, is indisputable. These applications are most useful in chronic disorders, such as rheumatic stiffness, and enlargement of the joints; but the relief of pain and internal inflammation, so often afforded by blisters, leaves us no room to doubt their value in many acute cases, especially if assisted by proper evacuants, rest, and appropriate temperature.

From the influence of cold and heat in relation to digestion, assimilation, and the action of the heart and lungs and nerves, we learn several points of great practical importance. If, for instance, the body be much exhausted either by cold, by want of food, or by disease, the first requisite is to recover and maintain the warmth of the body; for by this means, if at all, can the functions be restored; and, it must be remembered, that food may be received into the stomach and digested, which yet will furnish nothing to the blood to keep up the respiratory and warming process, unless the body be kept artificially warm, until it can generate warmth for itself. From inattention to this fact, death undoubtedly frequently results under circumstances that would not otherwise be fatal.

As the skin is the principal regulator of tempera-

ture, and the medium by which the balance of the general functions is preserved, it is manifest that its state is of such vast importance, that the means of preserving its health cannot be too familiarly understood ; and the public are deeply indebted to those who, with skill and vigour, urge upon them the propriety of considering how best they may secure the blessing of a healthy skin. If, indeed, the medical profession, as a whole, would give a little more attention to the physiology of the skin, it is not unlikely that some diseases now but *opprobria medicorum*, and the doctors' dread, would be more simply, more economically, and more successfully, encountered.

Exercise in cool and pure air is the grand promoter of healthy action in all the body, but especially in the liver, lungs, and skin, and therefore it is most conducive to the vigorous performance of the digestive functions, and also those of the brain.

There is no country in the world in which regular exercise is more necessary than in England, but the very uncertainty of weather, which renders the habit of being in the air so essential to health, is, in these days of fine clothes and sensibilities, the common cause of exercise being neglected. But if we would be fortified against the injurious influence of our fickle climate, we must accustom ourselves to brave all its changes in the open air, and

“Form to its manners our obsequious frames,  
And learn to suffer what we cannot shun.”

It will be sufficient incidentally to recur to the

mutual relations existing between the functions mentioned in this chapter; and all that is of practical importance in connexion with them must be looked for in general physiology, as well as in the infectious causes of diseases, to which we next turn our attention.

## CHAPTER XI.

### **INFECTIOUS AGENCIES, LOCAL MIASM, UNWHOLESOME FOOD, AND ANIMAL EFFLUVIA.**

THE seeds of infectious disease fly from body to body, and their proper soil is our depraved blood. All infecting agents are derived from dead animal or vegetable matter, or at least the decay of organized substances generally furnishes the vehicles of disease. Thus, the life and the death of the body are both traceable to other things that have lived, as if life and death were active and antagonist principles, constantly endeavouring to reduce matter from the dominion of one to that of the other.

The chief extrinsic causes of disease may be classed thus:—

1st. Local miasm from decaying vegetation producing intermittent, remittent, and other fevers.

2nd. Diseased and putrid, or decomposed, vegetable and animal food.

3rd. Animal effluvia, from decomposition, from morbid excretions, and from the overcrowding of living beings.

There are many peculiar and specific diseases propagated both by palpable and impalpable means, such, for instance, as small-pox and scarlet-fever, which may be conveyed directly by contact, (contagion,) or through the medium of the air, (infection.) These and those like them seem to produce a ferment in the blood, by which morbid matter, similar to that which originated them, is generated throughout the mass of circulating fluid, just as the yeast diffuses itself in the fermenting dough, or rather, as it is propagated and increased in a fermenting liquor, being first spread throughout, and then separated and thrown off. A little leaven leavens the whole. In small-pox and some other diseases, such as measles, the process is not apt to be repeated in the same body; and another ferment, cow-pock, may be substituted for that of small-pox, which has nearly the same effect in protecting the blood from any similar ferment, at least for many years. But the nature of such diseases cannot be further considered in this volume, and I refer to them only as in some measure connected with local miasm.

The vaccine protective against small-pox is perhaps the most surprising gift of Providence to the inhabitants of our world, and without it we should all have been exposed to the liability of receiving a most deadly and disfiguring pest. Without vaccination, the probability of life would be diminished more than one-half; but the prejudices that still rage against this protective among darkened minds is most lamentable, and although government wisely requires the parishes to provide gratuitous

vaccination for the poor, yet multitudes among them, either from ignorance or indifference, neglect to reap its advantages. The poor always need the countenance of their more favoured neighbours. District visitors may accomplish great good by combating this prejudice by friendly advice, by appealing to the example of informed parents, and by proving that attention to the means of health is a religious duty, which cannot be neglected without imminent peril.

Local miasms from defective drainage are the most pregnant causes of disease. We need heroes of the Herculean stamp to cleanse, drain, and irrigate the world we live in; but great wisdom, as well as power, is required in the undertaking; for though the means are abundant enough, the knowledge and combination necessary to employ them are at present, alas ! sought in vain. The whole surface of the earth bears upon it the marks of the curse that fell on it for man's sake; and it also bears evidence that the remedy which is to remove it must operate socially and under the compacts of civil government. Though we all well know that deficient drainage and accumulated decay spread disease and death in every neglected district of the earth, yet how little can private individuals accomplish towards the removal of those extensive causes of malady and woe ! Reflection on evil in all its forms, whether physical or moral, alike leads us to the conviction that men are to co-operate under civil governors and social institutions for the improvement of communities, both in physical comfort and mental advantage; for without

united efforts, under uniting laws, the fabric of society, like the ruins of a city, crumbles into fragments, to be soon covered with a rank sterility, where the springs that should have invigorated human life only encourage a stagnant virulence that bears death to human beings.

Hippocrates was the first to advise drainage, for the improvement of a large district. The city of Abidos had been several times depopulated by fevers, when he recommended that the marshes in its neighbourhood should be drained, after which the city became healthy. Doubtless Hippocrates derived his knowledge from the sages of earlier time, for the world of old was certainly not less practically wise than at present. The Romans learned from the Greeks, the Greeks from the Egyptians, the Egyptians, perhaps, from the first dwellers in the land of Shinar. They learned to drain their towns and to supply them with water, for bathing as well as drinking, in a manner to put to shame our boasted advancement in the arts of civilization ; and even the inhabitants of ancient Mexico and Peru enjoyed advantages in the way of sewerage and supply of water, which are denied to the denizens of our first and finest towns.

That is a good and striking fact stated by Dr. Gavin, in his "Sanitary Ramblings." He says, "the patent manure manufactory is established next door to a bottle merchant, who complains that the putrid emanations adhere to the inside of his bottles and spoils the wine that may be put into them, and consequently his trade will soon be ruined if the

manure manufactory is not removed." This circumstance affords another proof of the established fact, that putrescence acts, even through the air, as a leaven destructive to all substances containing saccharine and glutinous elements, whether the blood of the grape or of man.

What an amount of poison must be floating about in "that chaos of eternal smoke" hanging over London, with its "volatile corruption" arising from the decomposition of 52,000 corpses annually interred within its limits. The 218 acres in which they lie are black and greasy, the wells near them contain nitrates and other results of putrid decay, producing a tendency to dysentery and low fever: and the close courts around them must have a deadly atmosphere, which a man fresh from the country, with any sensibility of nerve, immediately perceives, and as quickly suffers from.

"It is not air, but floats a nauseous mass  
Of all obscene, corrupt, offensive things."

The decay of animal and vegetable substances together appears to be more injurious than that of either alone. Where these accumulate, as in the junction of sluggish streams with the tide, or where the tide occasionally overflows large tracts of land, and vegetation is vigorous, and the climate warm, there endemic causes of infection are most rife and dangerous. Large districts in our own country would be now, as formerly, the constant seats of a terrible mortality, but for drainage and cultivation, which do not allow the accumulation of decaying

matters in waste, but hasten to reconvert all refuse into the aliment of man and beast, by at once using it as manure. It should be observed, that vegetation tends rather to purify than to corrupt the air, where it is regulated by man, as at first appointed, and prevented from running to waste by rotting where it grows. It is the decay of vegetable matter, without being mixed with a due proportion of earthy matter, that produces intermittent fever, and where this is combined with other causes of disease, the malady is apt to be greatly intensified, and to be rendered extremely rapid in its course, as in yellow fever, plague, and cholera. When we consider the vast influence which the cultivation of the earth is known to exert upon the state of the atmosphere, and thence on the health of the world, we may without extravagance infer that man's neglect of duty with respect to tilling the ground on right principles, has really, to a great extent, poisoned the air he breathes, and caused the diffusion of various diseases which embitter and abbreviate his life, and render it impossible for the sanative principles, which we still, in a measure, retain in our constitution, to prevent the germination of those seeds of death which are sown within our bodies, as if by the passing breeze. It is no speculation to suppose that by proper cultivation the whole earth will become healthier: as cultivation increases, disease diminishes, and we have no reason to doubt that a universal activity of both the mind and body of man on right objects, to right ends, would be immediately followed by a corresponding improvement in his earthly abode, in the condition

of the body, and even in the dispositions and faculties of his mind.

It may be broadly asserted that, all other circumstances being equal, that residence is healthiest which is driest, best aired, best drained, most open to the light, moderately warmed, and furthest removed from cesspools, ditches, and mud. We must not confine the ill effects of these things to the occasional fevers they may originate. The evils arising from poisoned air live in permanent forms; for wherever endemic infection prevails, there, also, we see the greatest amount of permanent debility, and there we see the prevalence of those diseases which disfigure the person, and shackle the faculties of the soul, by causing the propagation of bodily deformity, as in rickets, scrofula, and the kindred maladies, idiocy, and depraved passions. As every evil has a habitat, and the devil knows his place, so every corruption of the soul is attended by some disregard to the wholesome laws of nature, and every sensual sin mostly riots where uncleanness makes her home, and where

“All husbandry doth lie on heaps,  
Corrupting in its own fertility.”

“Had means not been taken to secure the homogeneity of the air, at all times and under all circumstances, this important medium would not only have been constantly liable to local deteriorations, but its properties, long ere now, would have become deteriorated to such a degree, as to have rendered organic life physically impossible.”—PROUT.

Another common source of infection is unwholesome aliment. Food that, if properly prepared, is wholesome, by injudicious treatment becomes poisonous. As a rule, the exposure of animal substance for any considerable time to the action of air, heat, and moisture, decomposes its elements, but vegetable substances used for food are not so readily rendered injurious by cookery and keeping, since their putrefaction is not so poisonous. The flesh of animals that have died in a state of irritation and fatigue, is peculiarly unwholesome, and the morbid changes in the flesh are most rapid and deleterious in animals not bled to death, since then the blood contains the elements of decay in a free state ready to act. Any animal substance, but especially fish, is apt to become poisonous on being warmed up again and again. Any considerable quantity of animal substance minced up together as for sausages, and also un-salted curd kept unpressed and exposed to the air, are apt to become peculiarly poisonous. The change in these latter instances does not depend on ordinary putrefaction, but on a remarkable kind of decay, which is most readily produced by subjecting the substance to repeated changes of temperature, as from frost and thaw; and therefore the poison is most frequently found in the spring. Those acquainted with the subject, such as the German sausage-makers, detect its existence by an unpleasant and sweetish sour smell. The virulence of this poison, as also that in the flesh of over-driven animals, is shown by its producing violent inflammation, if in any way brought in contact with the

blood, as by inoculation through a scratch in the skin, whence spreading inflammation and gangrenous abscesses are produced, which generally prove fatal. The effects of such substances, when swallowed, is sometimes very remarkable, not being always productive of the effects of poison on the nervous system, stomach, and bowels, but inducing a slow decay of the muscles, so that they are at last almost entirely consumed. This is attributed to the actual communication of the peculiar putrefactive process from the decaying flesh to the living muscle.

The epidemics prevalent among cattle produce a state of their blood which renders their flesh very ready to putrefy, and even when used as fresh as possible, productive of diseased blood, dysentery, and putrid fever, in those who partake of it. The flesh of animals over-driven, has nearly the same effects. Decayed vegetable matter is also highly injurious to the system, producing dysentery, fever, and violent disorders of the stomach and nerves, which cannot be cured without a wholesome and well managed diet. Diseased corn, as when infected by smut, is highly pernicious. Grain, in which germination has commenced, is less nutritious than sound grain, and very apt to ferment in the stomach, and produce diarrhoea; but the worst form of disease affecting corn is *ergot*, or *spur*, which is well known to produce gangrene, spasm, wasting of the body, and other symptoms, according to the constitution and condition of those subjected to its effects. Probably it was this which caused many of the extensive epidemics of the middle ages, under the

name of *St. Anthony's fire, Ignis Sacer, &c.* In France, Switzerland, and Germany, multitudes of persons have been destroyed by it within a recent period.

Scurvy is a disease accompanied by a depraved state of the blood, attributed to improper diet, assisted by bad air and mental depression. It is generally cured by a good mixed and fresh diet. Sound potatoes, and other vegetables containing salts of potash, are said to prevent it; but as a substitute for these, lemon juice, when much salt food is used, has been found very efficacious, and it is therefore always provided for the use of the Royal Navy, which, though once dreadfully afflicted with this disease, is now nearly exempt from it; a result mainly attributable to a great and general improvement in discipline, ventilation, and diet.

This disease was very prevalent and destructive in England before the general cultivation of the potato, and it became again a common disease among the poor in several parts of the country, when the extensive potato-blight occurred in 1846. At that time Dr. Baly remarked, that the military prisoners at Millbank, dined like the other prisoners, except that they had no potatoes, were alone attacked by scurvy on that occasion, and when potatoes were supplied to them the disease ceased. It is probable that the citric and tartaric acids existing in the potato are combined with the nutriment in such a manner as to be peculiarly adapted to the blood, since the potato is found even more advantageous in many cases of scurvy than lemons and oranges. I dwell on this point because it proves that small

variations in diet are capable of producing vast effects on health, and that but for a fair and full distribution of the fruits of the earth, disease would be far more destructive than at present; and by neglect of small points in the diet of the poor, maladies from depraved blood would be now as rife and terrible as in the darker ages. The method by which potatoes are dried, so as to be fit to form part of ship-store, is an important invention, and highly valuable to sailors, since they may thus obtain in any climate a dish of mash-potatoes with the help of a little warm water.

Observing the benefit resulting from the use of phosphate of soda in certain depraved conditions of the blood, I think it probable that this salt would be of great service in scurvy. The proper dose would be from ten to thirty grains a day. As scurvy arises from salted meat in the absence of fresh meat and vegetables, the theory of its cause and cure almost resolves itself into a chemical problem. All animals need salt, since it furnishes ingredients for the blood, and is essential to digestion and secretion. How, then, is salted meat injurious? Simply from the circumstance that, in salting meat, the common salt takes the place of the soluble phosphates of the flesh, while these phosphates, so requisite for the production of healthy blood and sound flesh, are almost entirely removed from the flesh into the brine. It becomes then important to discover some better plan of preserving meat. By the exclusion of air, as by filling tin cases with meat, and then soldering them, meat may be preserved for years. The best

plan is to make a real concentration of the animal juices, as in portable soup. What is generally sold under this name, is but a gelatinous mass of very little value as nourishment. The following is the method of preparing this soup, or extract of meat, abridged from Liebig:—Chop very fine one pound of lean beef; mix it well with an equal weight of cold water; slowly heat the mixture to boiling; after boiling briskly a minute or two, strain through coarse linen. Salt and flavour according to taste, and tinge it with roasted onion or burnt sugar. This, when concentrated by slow evaporation, is a dark soft mass, half an ounce of which in a pint of water, makes a strong well-flavoured soup.

In considering the influence of *animal effluvium*, I shall chiefly confine attention to the evils of over-crowding. We have seen that the body grows and continues subject to life by the conversion of dead organic matter into its own substance; but this matter is removed from the influence of life as rapidly as it is brought under it, and as this removal of the dead material is effected by the union of oxygen with it, which oxygen is received into the lungs in breathing, it follows that, by every breath, we must so far vitiate the air around us; and therefore, if there be not a fresh supply of air in proportion to the demand of the living system, it must die. A healthy man spoils by breathing about fifty-seven hogsheads of fresh air every day; but one who takes spirituous or fermented liquors poisons more air in a given time than one who takes water only, and his system is more liable to disorder from any interruption to

the full performance of any of the functions, his heart and lungs being stimulated to over action, while the oxygen is diverted from its proper influence on the body, by combining with the elements of the stimulus taken.

The catastrophe in the Black Hole of Calcutta illustrates alike the influence both of deficiency of air and of the vitiating exhalations from the body. One hundred and forty-six persons were thrust into a prison eighteen feet square, having two small windows at one side. The prisoners had been previously greatly fatigued, and the weather was extremely warm. The effect of their position was first, burning heat of the skin, followed by a profuse perspiration, then extreme thirst, then hurried breathing, extreme agitation, palpitation of the heart, delirious excitement, faintings, death. Here we have all the symptoms of a rapid and violent fever. We shall not wonder at this, when we consider that each man, irrespective of the vapours exhaling from every pore of the skin, poisons the air with his breath, consuming through his lungs 1905 cubic inches of oxygen every hour, and exhaling an equal amount of carbonic acid gas. The two small windows served but to keep life flickering for awhile, and only twenty-three of the one hundred and forty-six were alive when the tyrant, who had thrust them into that hole, roused from his nap, and saw what he had done. It is an instructive fact, that all who survived were directly afterwards seized with putrid fever, accompanied with boils.—(*Smollett's England, A.D. 1756.*)

All living bodies must breathe oxygen, or die,

and all the animal functions are maintained by the incessant play of affinities between the atmosphere and the organs. We breathe about twenty times a minute.

“What frequent repetition of any ordinary prescription can ever approximate to

20	distinct and separate impulses	in 1 minute.
1200	”	1 hour.
28,800	”	24 hours.

and all these acting, not upon a secondary organ, but conveyed directly to the blood.”—(*Reid on Ventilation*, p. 217.)

The slave trade has furnished us with many horrible details in proof of the dependence of life on a *copious* supply of fresh air. I might refer to very recent evidence on the subject, not less appalling, but I choose rather that of sixty or seventy years ago. “I have often,” says Dr. Trotter, “observed the slaves drawing their breath with all the laborious and anxious efforts for life which are observed in expiring animals subjected by experiment to foul air, or in the exhausted receiver of an air-pump. Many have I seen dead, who the night before have shown no signs of indisposition. Mr. Wilson, about the same period, states that in his ship, and three others belonging to the same concern, they had 2064 slaves, and lost 586, and he adds, that others lost half their cargo.”

Ignorance or forgetfulness of the plain fact, that to live we must have a full supply of fresh air, has led to many horrible catastrophes. The black-hole at

Calcutta has been superseded in our remembrance by the suffocation of seventy poor Irish men, women, and children, in the fore-cabin of a steamer, in 1846, between Dublin and Liverpool. Neither the captain, mate, nor any of the crew, once considered that, by closing and nailing up the only entrance of air to the cabin, they as effectually killed the seventy fathers, mothers, and children, as if each had been suspended with a cord round the neck. The massacre was completed in a few minutes, and, so indifferent are men to the common laws of nature and of God, the only excuse for the dreadful deed was ignorance or thoughtlessness. The effects of inattention to the laws of Heaven are in all directions visible, and only less appalling because they are more scattered. There can be no doubt that the majority of those febrile diseases so rife among the poor are due to the want of breathing room; their sleeping apartments generally answer all purposes, being crowded and close, especially in the winter, when, by excluding air and huddling together, they try to obtain that warmth which poverty forbids them to seek by the cheerful and ventilating fire, and thus, too, moral corruption keeps pace with physical discomfort.

In proportion to the vitiation of the air by the breath, and by emanations from the body, it becomes capable of receiving and conveying the seeds of infectious disease. Thus, the typhoid fever, produced by famine or unwholesome food, is readily communicable wherever the ventilation is deficient, and thus war, and want, and ignorance, have always prepared a soil for the growth of pestilence in every

age and every clime. We have recently received a terrible proof that the danger of contagion may be vastly aggravated by the combined influence of deficient ventilation, unsuitable food, and causes of mental depression. Of the 1400 poor children farmed at Tooting, in 1849, 200 died of cholera within two weeks; and it was demonstrated that their diet was meagre, their sleeping room insufficient, and the treatment, both of mind and body, altogether unfavourable to the kindly development of natural power in those young beings. The pestilence seemed disarmed at once by using those means which Christian charity and common-sense dictated—good warm air, generous diet, proper clothing, and social, genial encouragement and comfort. Without these in a few days every child there would have died. In the workhouse at Taunton, in November, 1849, sixty persons out of 270 died of cholera within a fortnight; and of sixty-seven girls in the school, thirty-three were attacked, and twenty-five died. The school-room was low, damp, small, the diet poor, and the whole system of the house a mismanagement. The manner in which this mysterious malady selects its victims in the purlieus of wretchedness and among the inmates of crowded asylums speaks loudly to us all. The finger of God writes a warning on the walls of every dwelling against niggardliness and the neglect of common mercies. To live carelessly is to court destruction; and Charity herself will sin and lead to suffering if she use not the bounty of Providence on right principles liberally, naturally, wisely, well.

The Christian spirit teaches us that no truth relating to our nature can be neglected with impunity, and, moreover, adds this weighty question—If the ignorant suffer, what must be the judgment on those who pervert truth and will not convert their knowledge into wisdom by acting on the dictates of an instructed conscience?

## CHAPTER XII.

### THE MEANS OF PREVENTING INFECTION AND PREDISPOSITION TO DISEASE.

WHATEVER depresses the vital energies predisposes to the reception of infection, and whatever tends to promote the general vigour and orderly operations of life, tends also to fortify the system against all external as well as internal causes of disturbance. The means of health are the means of safety. The best *precautions against infection* are—1st. *A good conscience*, or moral courage, from a cheerful sense of being employed in a proper manner. 2. *A wholesome, regular diet*, with great moderation in every respect, the drink being neither too stimulant nor too diluent. 3. *Cleanliness* in the dwelling and the person. 4. *Free ventilation and fumigation*.

The right means of acquiring a *good conscience*, or true courage, is to put oneself directly under the guardianship of the Almighty, by faithful dedication to duty in a Christian spirit, knowing that our God is not only a faithful Creator, but also especially covenanted as the Saviour of all who trust and serve

him. But one who is a true servant neither presumptuously neglects the appointed means, nor timidly employs them. Foolhardiness is the reverse of fortitude, and prudence is guided by faith as well as knowledge, but she never listens to fear except when pointing to Heaven.

It is remarkable that the habit of visiting diseased persons lessens the tendency to receive infection ; thus, it is a rare thing for a medical practitioner in good health to become infected. He takes no precaution, except that of frequently washing his hands ; but he passes much time in the open air, and his mind is usually too busily engaged, and too familiar with what is called danger, to admit of fear in connexion with his duty ; he would, however, be very cautious not to breathe the air about a typhoid patient shut up by bed-curtains.

Very few ministers of religion who are in the habit of visiting the sick in the extreme stages of disease take infection. The Bishop of London stated in his letter concerning the thanksgiving after cholera, that in his diocese only two clergymen died of that disease in 1849. We find, however, that great fatigue and a depressed state of the body, whether from anxiety or deficiency of blood, predispose even those most habituated to the atmosphere of disease to the attack of epidemic and contagious disorders ; thus many nurses and medical men are destroyed by over-exertion during the prevalence of the more violent epidemics, such as cholera.

Reference to a fact will instruct us concerning the range and influence of *local malaria*. A party con-

sisting of thirty persons were exposed all night to the dangerous miasm of a marsh in a warm climate. They were all quite well for six days after their removal from the spot, but then about half their number were called to some duty that produced great fatigue. All these were seized with remittent fever in the worst form, but those who were not exposed to fatigue escaped the fever altogether, although they had been equally exposed to the malarious cause in the marsh. Thus, we see the evil might have been avoided but for the arduous labour. It is a duty, therefore, as far as possible, to avoid any exhausting exertion while exposed to other causes of disorder. Fear, however, has a far more depressing influence than fatigue, and the tremblings of a coward arise from a worse state of nerve than the shakings of an ague-fit. Our position must be determined by Providence, and therefore, under all circumstances, it is our wisdom and our happiness to cast ourselves implicitly on the directing hand that made and manages all the elements. He alone can confer on us true courage, and he always honours true faith, because it calmly employs the best means at hand, and is never too hurried to listen to prudence. With regard to diet as a means of preventing infection, it will be most unwise to think of directly strengthening the body against the influence of a suspected miasm by change of food, or by wine, spirits, or tonic medicines, unless under particular circumstances; for it must be remembered that whatever the system does not really demand at the time, or has not been accustomed to, will excite

disorder, and thus cause that form of debility which most predisposes the body to receive a prevalent malady. A stimulant injudiciously administered is followed by a depression of vital energy, which is similar in predisposing effect to the exhaustion of fatigue. It has been observed that those whose blood is somewhat deficient in red globules, and probably also in salts, are most apt to be affected by aguish, and intermittent diseases, and nerve-ache; and that those who take much animal substance are most liable to take eruptive fevers—such as small-pox, measles, and scarlet-fever—and are most likely to suffer severely from them. When the latter diseases prevail, therefore, a farinaceous and vegetable diet is most suitable, at least for those who are not otherwise protected. It is found that a diet of this kind is also best as a safeguard against the colds and inflammations which are apt to abound in spring and autumn, when sudden changes of temperature most frequently occur, and when, also, the eruptive fevers just spoken of are usually most prevalent.

Many absurd rules as to diet have been published during the incursions of cholera; and their absurdity appears particularly in the excessive prejudice produced against the use of fruit and vegetables. That disease, no doubt, prevailed most where these things were not good, and where fresh meat was scarce; but a moderate use of fresh vegetables was certainly advantageous and protective rather than otherwise. The cider drinkers of the country villages in Devonshire, who eat fresh vegetables freely, were not attacked, notwithstanding the apprehension that they

would especially suffer. In short, whatever diet is found wholesome under ordinary circumstances, is best during the epidemic; but bad water and foul air, and defective diet, will favour the extension of epidemics anywhere.

In case of being required to pass a short period, especially at night, in an infected neighbourhood, the use of a little wine, or cordial of any kind, such as camphor, is pronounced on good authority to be a preservative, and the more freely the system is supplied with fluid the better. But, of course, the means employed should be adapted to the constitution and habit of the person thus exposed, as well as qualified according to the nature of the infection apprehended. This, however, is certain: the body is least liable to receive a morbid influence, while the quantity of the blood is neither deficient nor redundant, and while the secretions and excretions are kept active and in order. A well-supplied system is little disposed to absorption, but an impoverished and exhausted body is ready to draw in every poison that may mingle with its breath, or come in contact with it at any open pore. As the old schoolmen used to say, "Whatever is received is received in proportion to the recipient;" an empty vessel may be filled, but a full one must be emptied before it can be otherwise occupied. Such a notion is not to be deemed too mechanical, while we know that life works in connexion with mechanism, and that vital chemistry is a matter of waste and supply.

*Cleanliness in the dwelling* is highly important, but it is often imprudently attained; thus we sometimes

see a house, in which the scrubbing-brush is seldom used, slopped and soused from top to bottom, with all the attendant nuisances of noise and noisome exhalations from newly-stirred impurities and hot water, at the very time when, from the prevalence of disease, and the condition of the atmosphere, quietness and a dry air are peculiarly desirable. In case of severe disease, a noisy abode invites the entrance of death, and a cold damp atmosphere is the worst a patient can be placed in; therefore *keep* the house clean, and study to be quiet.

The bedding ought to be frequently washed, and freely exposed to the air daily, and all slops, and everything offensive, should be quickly removed. Alas ! in multitudes of instances, we witness the spread of disease among the poor, simply because they cannot obtain good water enough, even to drink, and their dwellings are in no respect calculated for comfort, or the encouragement of cleanliness. Often have I known a whole house dependent on two or three pints of bad water per day as the sole means of purification. It is a heart-stirring sight to observe the indomitable courage and persevering energy of poor English mothers in their struggles, despite all discouragement, to bring up their children in cleanliness and decency, with the hope that the lot of their offspring will be at last better than their own. What a pity and shame that the best efforts of a fine humanity should be so often frustrated by the want of heaven's common bounties, pure light, air, and water.

The skin should be invigorated by washing with

water, or vinegar and water, or by dry friction with a hair-glove, a brush, or coarse cloth. Copious perspiration should be avoided. Flannel does not retain animal effluvium nearly so tenaciously as either cotton or linen, and it has, moreover, the advantage of preserving the body against the effects of sudden changes of temperature better than any other material, but nevertheless it requires to be frequently changed.

Those diseases which are communicated by touch, may be prevented by free ablution soon after contact, as a poison applied to the skin requires a certain time for its absorption, varying, according to its nature, from hours to days.

*Ventilation and fumigation* act favourably, first by diluting an infectious emanation, and then by removing it. Wherever endemic or local morbific influences prevail, damp and night-air are most pernicious. Hence the propriety of conducting ventilation in such a manner as to secure a full supply of dry and moderately warm air, as by the plan proposed by Dr. Arnott, always remembering that the chief bad airs are the heavy carbonic acid, and the light gas, hydrogen, so that there ought to be a vent near the floor, and the ceiling of every room.

The healthy active man feels the want of fresh air more than a sickly one, and a close room is a direct misery to him; but a famished person thinks more of warmth than of air. Want of food and of fuel will always be attended with pestilence and foul air, for those who are starving would only starve the quicker with a pure atmosphere. They crowd to-

gether to keep themselves warm, and a bad air suits their feelings best, for, as Dr. Reid says, "Defective ventilation reduces the oxygenation, preserves warmth, stupifies the feelings, and allays the pangs of hunger." It is a race between typhus and starvation. The Irish would have starved much faster but for the smokiness of their cabins. Give the poor employment, and the means of getting an abundance of food, fire, and clothing, and then their cottages may be riddled by the wind without much risk to their health, but to ventilate without furnishing food, is to blow the fire without adding coals, and thus to extinguish comfort and life together.

*Aromatic fumigations* are of doubtful benefit, but *chlorine*, even in very minute quantities, decomposes many poisonous gases, and probably possesses the power of destroying both the vehicle of morbid infection, and the infection itself. A convenient mode of using this disinfectant is this: place a little weak solution of chloride of lime in a shallow vessel, and pour into this a small quantity of hydrochloric acid, (muriatic acid, spirit of salt). Let the vessel containing these fluids be placed in the lower part of the house, so that the extricated gas may ascend, and be diffused through all the apartments. It is also desirable in many cases to dip portions of linen in a solution of chloride of lime, and hang them about the apartment to which the sick are confined. The chloride of zinc is very convenient for the destruction of offensive odours and effluvium, when thrown into the vessels employed as receptacles.

The perchloride of iron is also a good disinfectant

and deodorizer. Collins' disinfecting powder is very manageable and useful; it consists of three parts of chlorinated lime, with two of sulphate of alumina, or common alum; by the action of the atmosphere upon it, chlorine is evolved very freely.

Whether offensive gases are always the conveyers of infectious disease is doubtful; we know, however, that they often are; at least they are poisonous, and ought to be shunned. Chlorine decomposes all the poisonous gases, and experiment has shown that it also has the power of disinfecting water when impregnated with contagious matter, such as that of small-pox for instance; and from analogy, it is supposed capable of destroying the ferment of any disease which it may meet with in the air.

But remember that, to trust to fumigation of any kind without proper ventilation, is only to aggravate the evil; pure air is needed, and fumigation cannot create that; it must be brought in from the open heavens.

Sulphuretted hydrogen gas is the type of those poisonous gases that most speedily destroy life; like prussic acid, it suddenly stops all motion when breathed in any quantity. Even when diluted to an extreme degree, such gases diminish the influence of the vital air on the blood, and favour the incursion of all those diseases which are propagated through the air. Almost all things offensive to the smell contain gas partaking of this poisonous nature, and therefore they should, as far as possible, be avoided. Where they are unavoidable, their decomposition and destruction are expedited by the action of light,

especially when assisted by pure air. It is probable that the effluvia, which are the direct agents of infection, are of an alkaloid nature, or at least that they contain certain salts in a state of minute division, and that these are decomposed by any acid vapour, such as that of strong vinegar, and of nitric acid, both being disinfectants of great reputation, and worthy of trial, where chlorine cannot be procured.

Small doses of *chalybeates*, especially with alkaline salts and carbonic acid, as in soda water, often counteract the effects of impure air, in some degree, and seem to fortify the blood against those agents which tend to diminish the oxygenation of that fluid; and even where there is a tendency to slow inflammation, their action is not otherwise than beneficial, when combined with a more active saline, such as Cheltenham or Epsom salts; and a common Seidlitz powder is of no mean value when the blood is deteriorated by impure air, particularly if taken with some simple bitter. The *diluted* sulphuric acid, in doses of ten or fifteen drops in a wine-glass of water, twice or thrice a-day, is said by persons familiar with malarious neighbourhoods to be of great service in enabling the blood to resist miasm.

Every breath and every movement of the body in the air, and of the air upon the body, is attended by an electrical change in the surface on which the air acts. The *electrical condition* of the body has a marked influence on the health, and the amount of electrical influence mainly depends on the degree of warmth, humidity, and light, to which the body may

be exposed. A damp state of the air most readily diminishes the electricity of the body, and as experiments have proved electricity to be concerned in all the functions of life, we may well conclude, that any sudden diminution of this agency would directly exert an injurious influence on health. It may not be unphilosophical to attribute the depressing effect of night air and marsh-malaria to the rapid abstraction of electricity and heat from the body, since we are assured that if a person can keep himself perfectly dry and warm by the help of a good fire, he may pass a night in a malarious neighbourhood with comparative impunity. Although we would not venture quite so far as some bold theorists have done, who represent human beings, body and soul, as acting and thinking on electrical principles, yet by numerous facts and by considerations, too recondite for these pages, we are warranted in concluding that those means which best preserve the body in a state of positive electricity are, on the whole, most conducive to health, and these are good food, a clean skin, woollen dress, moderate exercise, dry air, and a cheerful mind.

The electrical condition of the atmosphere greatly influences the excretions, and operates peculiarly on the glands and absorbents. Glandular tumours are more prevalent in damp and cold than in dry and warm situations. An electric current, when properly applied, often cures such diseases, and it is especially beneficial in functional obstructions of all kinds. Such maladies are also frequently remedied by removal from a damp air to a climate more positively

electrical. A continued surcharge of electricity is, however, productive of debility ; it over-excites the kidneys and the skin, and favours rapid changes of the fluids ; thus we observe that thundery weather causes milk more quickly to turn sour, taints butcher's meat, and converts the brewer's wort into vinegar. In such weather, frequent ablution is most desirable, and the use of alkaline drinks, such as soda-water, is beneficial..

Temperature, electricity, and the degree of moisture in the air are in mutual relation to each other ; but their influence upon the body is modified by its condition. Thus, a man whose heart is feeble, and whose system is badly supplied with blood, finds that amount of moisture and heat most genial to his feelings, which a person full of blood finds most oppressive and relaxing. A dry cold air is invigorating to a well-fed man, but extremely depressing to the weak, and to be "starved with cold" is felt to be a phrase expressive of a truth, for cold causes an ill-nourished body the more rapidly to famish, and thus proves but the converse of starvation, which produces a rapid sinking of the warmth of the body while wasting its substance. One who is exhausted by exertion, and whose fluids are reduced by perspiration, is so far nearer to the condition of a starving man, and like him will be apt to suffer from cold, and from sudden reactions, and consequent feverish disorder. To one in this state a warm bath is for a time almost as refreshing as a good meal and a rest. Exposure to cold after exertion is, however, most productive of disease in those who

have been accustomed to over-stimulation; their nerves are in the worst condition to bear the loss of electricity; their systems more readily collapse when deprived of their artificial stimulus, and hence it is that those who have addicted themselves to the habit of "drinking" seem called upon by a feeling of bodily necessity to continue their evil practice. In fact, we are well assured that such persons would be more liable to suffer from any cause of disease to which they might be exposed when deprived of alcoholic stimulants, than those who never indulged in them, for stimulation always predisposes to depression. It is in the spring and autumn, when cold is apt to alternate with relaxing warmth, that catarrh, influenza, and inflammatory and congestive diseases of the chest and mucous surfaces are most prevalent. The known causes of such disorders suggest the mode of cure, and experience has taught us to favour transpiration by the skin without exciting undue action of the heart, by an abundant use of warm fluids, by resting the body in moderately warm air, and by the employment of such medicines as slightly increase the excretions, while they counteract nervous disturbance.

Civilized nations do not now anoint their bodies with oil as the ancients did, and it is not improbable that in consequence we suffer somewhat more than they from changes in the electrical states and temperature of the air. Almost all those tribes whose abode in a warm climate induces them to use but little clothing, usually besmear themselves with unctuous substances, which certainly have the effect

of greatly diminishing the susceptibility of the skin to atmospheric variations; and many facts seem to show that a free use of oil in this manner also lessens the liability to the influence of malaria; dealers in oil are even said to be exempt from plague. J. Jackson, F.S.A., in his work on the "Commerce of the Mediterranean," says, that the porters who work in the oil-stores at Tunis never have been known to take the plague which often rages frightfully in that place. They smear their bodies with oil, and live almost entirely on bread and oil. Musquitoes never bite them. They are in the habit of sleeping on the bare ground in the streets during the summer; but Mr. Jackson states, that though he has frequently seen scorpions and other venomous creatures running about them in great numbers, he never heard of their being injured by them. He adds, that at Tunis, when any one is stung by a scorpion, they immediately scrape the part with a knife, and quickly rub on olive oil, which arrests the progress of the venom. This remedy is found to be powerful against the poison of the viper.

In connexion with such considerations as relate to our protection from the influence of sudden changes in the electrical state and temperature of the air, nothing is more manifestly important than clothing; and that it should be adapted to the climate and its changes is sufficiently evident.

When the French, in the madness of one of their revolutions, 1793, adopted the classic dress of Athens, they should also have adopted the unguents of the savages. What was the consequence of their being

so classically indecent? Nature resented the universal outrage by inflicting upon them a multitude of acute diseases of the lungs and bowels, until learning a little wisdom from the effects of their great folly, they again clothed themselves in a manner more suitable to their climate and their habits. All sudden transitions are prejudicial to the forces of life, and that clothing is, on the whole, best for health which is felt to afford the best protection against the weather without encumbering the body or impeding the free exercise of the muscles. The Almighty provides wool and hair as the natural coverings of animals, and therefore these must generally be suitable for the human body; and, in fact, experience in all climates has proved that under ordinary circumstances they afford the best clothing for man, preserving the surface from the sudden influence alike of heat and cold. Sir James Macgregor observed that the best-clothed regiments were the healthiest during the Peninsular war; and Sir George Ballingal, in his lectures on Military Surgery, says, that he saw striking proofs of the utility of flannel on all occasions. When Captain Murray returned from Labrador, in 1823, he was ordered to sail immediately for the West Indies, and he surprised the purser by ordering two extra flannel shirts and pairs of drawers for each man under his command, with an injunction to see that they were worn. His former experience had convinced him of the efficacy of flannel in protecting the body from those sudden and great changes of temperature which render hot climates peculiarly baneful to Europeans. The result proved the cor-

rectness of his opinion. After visiting the West Indies and many parts in the Gulph of Mexico, he returned with his crew of 150 men, not one of whom had suffered from any disease in the interim. Of course he adopted means to ventilate the ship and keep it dry, but, above all, he exerted himself to promote cheerfulness among the men. When Captain Murray commanded the Recruit, which lay nine weeks at Vera Cruz, the same means preserved his crew in health, while the ships of war anchored around him lost from twenty to fifty men each.

Appearance, alas! is generally more regarded than health in the construction and the materials of our garments; but health and elegance ought to be alike studied. I would by no means discourage an attention to taste in dress, since the cultivation of a sense of beauty, or of the becoming, even in the form and colour of our habiliments, besides affording domestic and social occupation, is not without a moral influence, and may contribute largely to our health by promoting our happiness, and aiding to preserve our character and consistency. Disregard to such considerations can occur only in minds that depreciate the forms and colours with which the God of nature has beautified and animated the world, that souls should influence each other. On the ground of beauty and its effects in cheering the heart, and when properly appreciated of improving the understanding also, I would denounce the unnatural horrors and deformities produced by an abuse of stays. There is no beauty in anything that tends to distort the figure or to destroy health. It is, how-

ever, enough to say that the heart, lungs, liver, bowels, and even the very bones of the back, chest, and, by implicated action, the bones of the whole frame, become distorted and diseased by tight lacing: and maladies are thus produced which are apt to excite disgust, to aggravate the mother's pangs, and to cause, too frequently, the offspring to inherit the deformity and feebleness which render life a burthen instead of a delight. The evils of compression are not confined to the lovelier sex: I have seen a young officer—how much of a soldier I cannot say—whose stomach, liver, heart, and lungs were injured by the pressure of a broad and buckled belt; and it is no uncommon thing to see disease of the spine in men, perhaps sometimes brought on, but certainly often aggravated, by tight bracing, which has the effect of a continual weight pressing on the vertebral column in all positions of the body. This evil can be relieved only by removing the cause, and allowing the bones and muscles full play and proper rest. A stock, neck-cloth, or shirt-collar tightly fastened is absolutely dangerous. There is much reason to believe that diseases of the brain of a fatal character have been brought on in states of excitement in consequence of pressure on the neck, thus applied, as this pressure prevents the return of the blood from the *sinuses* and veins of the brain and skull with sufficient rapidity when the heart is acting violently, and thus the fine inelastic vessels of the brain may suddenly be ruptured.

*Warmth, light, and a certain degree of moisture* in the air, are essential to life, but their excess is as destruc-

tive as their deficiency, simply because their united operation under certain conditions is coincident with the evolution of those electrical and vital forces by which the chemistry of organism is carried on. But the action of *light* on health is less observed, though not less important than that of other agencies which constantly act upon us. This is best evinced in the vital depression, morbid sensibility, nervousness, and impoverishment of blood which the protracted exclusion of light from the body almost invariably induces. All who are blessed with sight must feel the animating power of the brilliant day upon the mind; but we may well suppose that the benevolence of the Creator towards ourselves is not limited in this respect to our ability to see, and it is beyond question that colour acts upon the body irrespectively of its effects upon the mind; it exists not merely to please the eye, but exerts a direct influence on chemistry and life. Each ray of the *spectrum*, each colour beaming from the clouds, influences vital organism in a manner peculiar to itself. It is no chance-work that the sunshine is scattered, and *diffused*, and *melted* into the sky; it is no chance-work that the infinite heavens are spread out before our gaze like a *blue* ocean, ever attracting the eye and never fatiguing it; it is no chance-work that "rosy red love's proper hue" is apt to mingle with shadowings of glory morning and evening in the eastern and the western sky; it is no chance-work that each season smiles with a peculiar brilliance as it greets and blesses this living earth. The grey clouds and blue sky of the spring, together with its

graduated warmth, especially promote the germination of the seed and the healthy unfolding of the first and tender leaves. The clearer brightness of the full summer favours the action of adult vegetation, by enabling the leaves more freely to absorb carbonic acid, and to give out oxygen; while the glowing and golden autumn has a ripening influence on the seed, which warmth and brightness alone would never manifest. In all these effects on vegetation the animated frame of man very greatly sympathises; and it is in vain to look for vigorous development in our children, if they are not permitted fully to enjoy the glories of the boundless azure and the golden brilliancy of the opening sky, through all the changes of the day, and of the seasons, as Time rolls along with them in his chariot of light. The absence of direct sun-light co-operating with insufficient exercise and want of fresh air, favours deformity and morbid development both in the mind and the body.

Light is essential to the development of fibrous vegetables, since if deprived of it the plant becomes a monster, without wood, and having no farinaceous deposit, flower, or seed. The carbonic acid is not duly absorbed, the carbon does not become fixed to form woody fibre, and the oxygen is not evolved, except in the light. In short, as without direct light the vegetable world would no longer purify the air breathed by animals, so neither would the oxygen received by the lungs effect the healthful changes of the blood; the blood-cells would remain imperfect, and the whole body would degenerate like a blanched plant. A tadpole shut from the light

grows into a gigantic tadpole, but never becomes a frog, and a human being deprived from birth of God's bounteous light might grow into a flabby giant, or more likely into a deformed and etiolated dwarf, but never into the noble form designed to represent the Deity—"erect and tall, Godlike erect, with native honour clad." It is not wonderful that barbarians that walk freely in the light should seldom see deformity, nor is it surprising that among the inhabitants of cellars and dark alleys, beauty disappears, while distortion takes its place. In short, beauty and health are nearly related, and both are so far dependent upon light, that every living thing formed to move under the guidance of sight becomes diseased and deformed when precluded from the full enjoyment of the day.

The cure of disease is much retarded and often quite impossible in a dark abode, and a northern aspect is most unfavourable to feeble persons. In darkness, too, the immoral passions are at home, and the physical effect of gloom is to encourage vice; for thus impressibility is increased, while the moral command is diminished; and we cannot but feel that the results—vapid blood, a weak heart, tremulous nerves, and senses preternaturally acute—are incompatible with that discipline of the mental faculties, and that habit of self-control, on which our usefulness and consequent happiness so much depend. We shall be wise and we shall do well when we observe and obey the laws which God has impressed upon our bodies, and written, as with his finger, upon the heavens, and we are bound to think

for others as for ourselves. Love is inscribed in every ray of light: it trembles on the waters, it fills the skies, it enters to our souls, it warms our hearts; the whole economy of outward existence, and of sensuous being, is but the medium of Almighty Love revealed to us as Light, and to dwell in outer darkness is to neglect the lessons that Light teaches. From the doctrines of Heaven concerning health, therefore, whether relating to that which perishes as it is employed, or that which endures unto eternal life, with an ever-improving capacity and power, still this is the grand lesson—the body is used to right ends only so far as we fulfil the laws of God, because these are essentially the laws of order, benevolence, and truth: and these require Christians at least to associate under the direction of the Word and Wisdom of God, with the definite intention of making the blessings of Heaven common to all the families of man.

## CHAPTER XIII.

### BODILY CONDITION AND TEMPERAMENT.

THERE are two especial conditions connected with the quality and quantity of the blood which remarkably predispose to disease: a plethoric state and a cachectic state. In vascular plethora the appearance usually indicates the condition: the face is full or bloated, the eye rather congested, the features injected rather than healthily florid, and there is a tendency to corpulence, but without muscular robustness or energy. The vessels are overcharged with blood; hence there is danger in such a case on any considerable change of temperature or of atmospheric pressure; and sudden and great demand upon the system, either by mental or physical exertion, is apt to be followed by congestion, inflammation, or even the rupture of a blood-vessel; in short, in such a state any cause, either of excitement or debility, is alike dangerous. Stimulation of course places a person of such a habit on the edge of a precipice; for unless the stimulation excite some excretion, by which the quantity of fluid in circulation may be immediately

reduced, great disorder is likely to occur in the extreme vessels, which may terminate in effusion, or some violence to the more delicate parts of the organism. A person only approaching to this habit may easily be placed in circumstances in which all the dangers of the most plethoric conditions shall accumulate in him. Thus, a strong healthy man accustomed to furnish his stomach very liberally, but at the same time taking abundant exercise in the open air in a climate like that of England, keeps himself, as it were, in high training, and capable of immense exertion both of mind and body. But this man is called to go to India, we will suppose. What happens? He continues to live freely, he takes brandy and water, Hudson's ale, or London porter, and animal and exciting food, *ad libitum*; but his strength of muscle is not improved by his strong digestion; his robust frame is enervated by the heat, and he sinks listlessly on the sofa, and seeks refreshment from the punka and by sipping cold punch. Now, if some function be not called into unnatural activity, in order to relieve plethora, that is to say, if there be not excessive perspiration or some equivalent excretion, the blood will rapidly become vitiated, and some violent disease of the intestines, the liver, the lungs, or the brain, will be the inevitable result.

A state not dissimilar may be induced in such a person without going to India: the artificial climate of a hot room will fully answer the purpose. The danger is greater if the person have arrived at an age when convivial and exciting conversation is more

agreeable than a walk or a ride. We will suppose him at dinner with a choice party of his friends, on the verge of Christmas. The room is well warmed, the blazing fires are cheering, the viands inviting, the appetite keen, the spirits of the company are high; “the feast of reason and the flow of soul” mean for the nonce a plenty of good things devoured, not uttered. The portly man dilates in every feature and every limb; his redolent cheeks glow with kindly sentiment and generous wine; his very fingers seem to ripen; his whole being is a solid satisfaction; railways are forgotten, and he would subscribe his guinea towards treating the paupers with plum-pudding on Christmas day. Mark the end: this goodly person has spent his evening in a hot room, a sort of home-made India, his plethora has been suddenly matured, he has been highly excited and yet fatigued; and when, about midnight, he goes into the frosty air, his overcharged system offers little resistance to its influence, the springs of life become oppressed, congestion instead of reaction follows, the fine vessels of the brain give way, and he falls into apoplexy or palsy; or if this familiar catastrophe be averted, inflammatory action is set up in the burdened viscera, which, if it do not destroy life, lays the basis of some chronic malady, and the portly man becomes a hypochondriac to the end of his days. The means of preventing such a state are soon expressed—moderation in all things: or if the temper lead to excess, let it be only in exercise, especially walking.

The dangers of the opposite condition, that of

depraved and deficient blood, are equally evident, but they demand more of our pity, since they are attended by greater distress of mind, and, indeed, are usually witnessed chiefly among the extremely impoverished and the unhappy.

The quantity of the blood may be considerably diminished, without much affecting its quality, and as long as that is the case, the body may, under circumstances in other respects favourable, be kept in tolerable health, although there will be more or less deficiency of muscular power and development in such a case. It usually happens, however, that insufficient supply of blood not only produces general meagreness, but also a deterioration of all the fluids of the body, and hence the feeling of debility is ordinarily attended by a multitude of other morbid symptoms, such as nervous sensitiveness, palpitations, spasmodic disorder, headache, listlessness, heartburn, weak digestion, flatulence, irregular appetite, great susceptibility to cold, and all the usual indications of defective tone, both in mind and body, such as incapacity to keep up attention or effort, and great irritability of temper. The causes of this state being understood to arise from insufficient or improper food, the mode of treatment is manifest enough. Yet, nevertheless, both prevention and cure are very often extremely difficult; for ignorance, depravity, and famine, are not to be met by a doctor's prescription, but by the wide diffusion of Christian intelligence and good feeling. When M. Gaspard investigated the state of the fluids in the people around him, who, from the pressure of famine, were

literally obliged to eat grass ; he, of course, discovered very bad blood, but it needed not his research to inform us what was wanting. And so it is with our unhappy and neglected brethren ; wherever their souls are devastated by evil habits, by improvidence, by the grievous discouragements of misplaced wealth ; and wherever the soil rewards not those who should live by toil upon its generous fruits, there hunger and savage thoughts prey together on the vitals. There we see the blanched or livid cheek, the lustrous languid eye, the tremulous swollen limbs tottering under a wasting body, the breath hurried at every effort, the incapacity to face the eye of the healthy stranger ; there we see the confused memory, the vagrant mind, the enfeebled patience of a being not in possession of God's free bounty of light, and air, and food, and fellowship of heart and soul. Some agency of man and evil spirits has interfered with the divine laws of nature and of grace, and the pauperised creature is deprived of the provision made for him by the Creator. This state of things is frequently witnessed among those who labour for their poor livelihood in gloomy and impure air, as in mines and certain manufactories. It is common in towns, especially among young females, who are employed in bad air, and in a monotonous and sedentary manner, without any of those animating associations and home comforts that bring the better dispositions of humanity into hopeful exercise. The prevalence of hydrogen gas, or its compounds, in all close places, and about houses not well drained, lighted, and ventilated, is a great predisposing cause of much of the

sickliness of mind and body among the female population of this country. The compounds of hydrogen in a gaseous state, particularly sulphuretted and phosphoretted hydrogen, which arise from all drains, exert a most pernicious influence on the blood, having the power even in very small quantities of preventing those vital changes which it is the purpose of breathing to produce. The air being infected by this gas ever so little, the breath conveys the poison to the blood through the lungs, and there hinders the oxygen from combining with the blood-vesicles, so that the vital fluid returns without its proper proportion of new energy, and the system thus gradually becomes enfeebled, the blood watery, the vital organs congested, the heart oppressed, the brain confused, and the countenance heavy, or kindled only with the pallid brilliance of anxiety and anguish. The evil is often aggravated by smoky chimneys and deficiency of light, bad diet, excessive indulgence in tea, and an occasional draught of some vile compound called a cordial, such as gin. Every one who has seen much of public medical practice, will acknowledge that depressed and dyspeptic females, who are accustomed to sit in close rooms, constitute the large majority of patients, and that mainly from causes connected with their abodes or employments. But whatever the prominent cause may be, it is working vast evil among our town-populations, and the young among them inherit a feebleness which will hereafter be manifest in the degradation of our country, unless the wise, the willing, and the able, set themselves with all their mind, heart, and means,

to ameliorate the condition of their poor, and oppressed, and unenlightened brethren, by employing them in pure air, and instructing them to improve their homes. It is woful to think of the havoc of life and happiness constantly proceeding among us from causes evidently springing out of neglect, and therefore to be avoided by attention and activity. Avarice and ignorance work together in spreading desolation, and the laws of Christ are everywhere broken. Let us obey our only Lord and Master; then the light of truth and goodness, as from Himself, will be seen alike in science and in revelation, and these together will clear the dark places of our land, and the miseries engendered by the cruel brood of ignorance and selfishness will vanish, or be seen only to be hooted.

Let all who suffer from a depraved state of blood do their best to enjoy pure air, cheerful light, sound diet, and a peaceful, active state of mind. Be familiar with the fields, and let the breezes play with you, or if these are out of reach, look upwards for heaven's light, and you will find it. The best place of resort for such a class of invalids is wherever exercise may easily be taken, and a feeble person may saunter in the sunshine, and behold beauty,

“Where thyme, the love of bees, perfumes the air.”

The soil should be dry, and if the water be somewhat chalybeate, so much the better. From the earliest records of medicine, it appears that remedies containing iron have been in use for this state of blood, and the chemistry of our day only confirms the experience of physicians in all ages. But if a

man really needs medicine, he also needs a doctor ; probably, however, persons who have been merely enfeebled by any of the causes just mentioned, will soon discover that they require neither, if they can but secure fresh air, good diet, leisurely employment, and sunshine within and without.

All persons, whether stout or not, if confined to close, monotonous, and anxious or cheerless occupation, are prone to approach more or less to the cachectic state just described ; hence the benefit of an occasional holiday, and change of air, diet, scene, and society. Convalescence from acute disease is to be treated nearly on the same principles. Almost every disorder at first demands great abstinence ; but if this be injudiciously prolonged, a chronic malady is apt to be established ; this evil, however, as well as the fear of relapse, may generally be avoided by some change of air soon after recovery from the acute symptoms.

Thousands of poor fathers and mothers lose their lives in our great hospitals, in consequence of remaining in them after the diseases for which they were admitted have been cured. Their convalescence is often slow, they are just in the state to take infection readily ; there is no refreshing greensward on which they may saunter to gather strength in the sunshine and fresh air, and they frequently relapse, or take some new malady and die. Thousands, to avoid this danger, are hurried back to their families, while utterly unfit to endure their straitened, disquieting, ill-aired, sunless homes ; and thus, if not soon returned to the hospital, they never thoroughly

recover, but linger on in feeble wretchedness. Hospitals for convalescents, situated in favourable spots, beyond the smoke and noise of town, would prevent immense misery, and be but a natural and beautiful branch of our national philanthropy.

A tendency to dropsy, or an excess of lymph in the system, is apt to occur whenever the blood is depraved without any rapid wasting of the fluids. Evacuants, with tonics, have been the most successful treatment of this tendency from the times of the Greek and Roman physicians to the present. They employed purgatives, bitters, and chalybeates in such cases, and experience proved the efficacy of iron, with skilful management, in conjunction with salines in all lymphatic disorders many centuries before it was dreamed that iron was an ingredient of the blood, and the conveyer of oxygen to the organs.

A change in the mode of living often suffices for the cure of that tendency to dropsy which arises from want of tone, but it is always much assisted by the use of pretty free draughts of cold water, followed by brisk exercise, for thus the kidneys and skin are roused to activity, the lymphatic system is relieved, and the heart and lungs perform their duty well.

Gout and rheumatism are also apt to attack those who suffer from an impoverishment of the blood, but more frequently when it is consequent on an abuse of the stomach; since this abuse in weakly inactive persons is almost certain to be followed or accompanied by torpidity of the liver, skin, and kidneys. It is in this state that tonics, salines, and evacuants, together with the other advantages usually

found at watering-places, are most beneficial. But in considering the influence of the state of the blood in begetting a tendency to disorder, we must remember that the temperament and age of the individual are not without their effect in determining his predisposition to disease.

*Temperament* is a term expressive of constitutional character with respect to the development and energy of particular parts of the bodily system. Popular physiologists mention only four temperaments—the lymphatic, or phlegmatic, the sanguine, the fibrous, or bilious, and the nervous, or melancholic. Although these distinctions are rather arbitrary, and perhaps in some respects imaginary, they nevertheless assist us to appreciate certain varieties in habit and condition.

The *lymphatic* constitution is marked by vigour of digestion without a corresponding vigour of the other functions, and it is said to be characterized by a fair skin, light hair, languid circulation, and general fulness of the venous system, together with inactivity, and a tendency to fat. As to the fair skin and light hair, it is enough to say that negroes and Hindoos often exhibit the lymphatic temperament.

In the *sanguine* constitution we observe a free circulation of the blood, with a glowing complexion, rapidity of conception, and vivacity of manner.

The *fibrous* is distinguished by muscular energy, strongly-marked contour, and determinateness of mental character, with black hair and coarse skin.

The *nervous* or melancholic presents indications of inordinate and irregular activity of the brain and

nerves, with deficiency of assimilative power and general sensitiveness, or "*physiopathy*;" and hence the countenance is apt to be

"Sicklied o'er with the pale cast of thought,"  
and expressive alike of anxiety and affection.

If we trusted to general appearances in forming a judgment of bodily condition, we should generally be in great error, and the most conversant with outward indications are best aware of the fallacy of trusting to them. The temperaments are often so blended together, that it would be necessary to combine all the epithets above employed to describe an individual; and in the course of a few years, and even during the course of a disease, a man not unfrequently presents more or less of each variety of constitution. Our management should be directed to prevent the tendency to either of the extremes.

1. The lymphatic should restrain the appetite and stimulate the muscles, heroically abbreviate sleep, keep alert to duty, avoid warm slops, and as a rule prefer a dry and rather animal diet. 2. The sanguine should aim at steadyng the attention by moderation in all things, especially his expectations, for his tendency is to overlook immediate danger, as if, to use a figure, by gazing at the sunshine dancing on the distant sea. In the warmth of conviviality, such a man forgets that fear which would be his safeguard, and with a hearty laugh he invites the evil spirit concealed in the wine-cup "to steal away his brains," and lead him to destruction. How often have we seen a sanguine youth reduced to a

wretched, lymphatic, nervous, or melancholy man, by cigars and dissipation.

3. The fibrous man is a choleric or bilious character, and his temperament is accompanied by that energy of thought and feeling which distinguishes the races formed by the mixture of the Celt, the Saxon, and the Roman, and which is about to command the world. Such characters, however, are apt, in endeavouring to master others, to enslave themselves; and, with imperious determination to obtain a position, they frequently so devote their energy to business as to sacrifice health. Probably, the genuine Jew is the true type of this temperament, for he, though conquered, is never quelled; he sifts the dust for gold, and looks to the Highest out of the grave. Free-living, stimulants, and spices, tend to render a man of the bilious class an abomination, where he might be a blessing. Being constituted for labour, both of body and mind, he is required duly to proportion the exercises of both, and to employ that kind of aliment which he finds invigorating without producing undue excitement. With the help of moderation such a man is likely to lead a long and useful life; but without good principles, he is more apt to become a Shylock than a Daniel, with an acerb face and cruel temper, rather than a good complexion and a wise heart.

4. The nervous man is already diseased: he has an over-active brain, that is apt to work the more the more it needs rest. The duty in his case is to divert the mind by employing the muscles, and to soothe the sensibilities by engaging the senses. Let

him seek society, and solace himself by quietly trying to improve it. Let him feel that there is neither hurry nor permanent shade in the heavens about us, and that darkness is only to refresh us for the light. Let him invigorate the digestive functions, by avoiding anxious study, by breathing the free air, by brisk exercise on the hills, by light yet nourishing diet, by abstinence from tea and coffee, and, in short, by attention to all that common sense and physiology teach us concerning the propriety of preserving the balance between thought and action, the use of the muscles and the business of the brain.

## CHAPTER XIV.

### NURSERY HYGIÉNE.

WE have only to look into the condition of those about us to see how powerfully the parents' bodily and mental states influence the constitution and predispositions of the offspring. The excessively refined are nearly on a par with the most depraved and ill-conditioned in respect to the propagation of deformity and disease. Insanity, rickets, scrofula, gout, and consumption, are apt to be hereditary; but an unhappy pair, whose habits of mind and body are not those of obedience to order and to Heaven, may yet, though untainted by these maladies, be the means of introducing these and other disorders of conformation and of temper among their offspring. And, on the contrary, it is possible for persons predisposed to such diseases, so completely to improve the whole economy of their bodies by proper attention to their habits, and by training themselves in the right use of diet, air, and exercise, and by the practice of all that is understood by temperance and virtue, that their children shall be entirely free from

inherited diseases. The duty of regarding such matters is incumbent on both sexes, and puny men and women, whose sensibilities are all distorted, and whose nerves are altogether awry, and as sensitive and as much in the way as a sore finger, ought not to permit themselves to think of marrying until, by all the virtues of self-management, they are so far fortified, morally and physically, that they shall at least need no artificial cordials for their comfort, and no particular indulgences to make them tolerable. Life itself should be a sober hilarity, all the senses should be in harmony with nature, and the heart should be ready to respond at the right period with a holy fidelity and temperateness to the mysterious demands of that love which unites existences, and in the homes of earth educates beings to dwell in heaven. How buoyantly a healthy body and a faithful mind bear up under the burthens of life when animated by true love! What an irrepressible spring of vigour accompanies the good hopes of those who are united in their efforts to obtain blessings on the unfailing principle of trusting God, and helping each other! To be thus in health in will and action, what is it but to be consciously in fellowship with our Maker, by proceeding in the way he has ordained for our welfare!

It is the purpose and end of Christianity to introduce us by the right way to perfect health, both of body and soul; and if sickliness abounds among us, its true cause is not to be looked for in the accidents of nature merely, but rather in our moral and physical perversions: and it may be, that disregard of

the Divine laws of health, as laid down in that Book which we profess to hold sacred, is really the direct cause of much of the bodily pain we experience. But, not to venture far, we would only consider what is the requirement of the new covenant with regard to marriage. We find it is a holy ordinance to be entered on in the name of our Lord, without a constant reference to whose honour it can neither be blameless nor free from judgment. If the words approved by sages and by saints be true, the conditions of health are broken whenever wedlock is irreligiously entered on, for if one professing Christianity do not marry in the spirit of heavenly faith and love, so far that person denies the Lord, whom he professes to adore; and then, not living in the daily consciousness that the body itself is dedicated, in life and in death, to Him who formed it, the sacredness of existence is forgotten, the temple of God is profaned, and evil passions and evil spirits fill the beauteous fabric with desecration and disorder. These observations will seem absurd to those who are accustomed to look no further than the body for the sources of disease. With such persons any reference to spiritual causes suggests no definite ideas, but only awakens a shadowy and confused dreaminess of mind, which they attribute not to their own ignorance and bewilderment, but to him who by allusion to a truth sets their erroneous fancies into action. Nevertheless, in the reverence due to all that is holy, we contend that disease is rooted in disobedience. Christians, you sin especially, and must especially suffer for your sins, if

you marry without full respect to the covenant of grace, the bond of perfectness, the charity that fails not. And it behoves all professed believers who are married to search for what is signified by these words, "*If they* continue in faith, and charity, and holiness, *with sobriety.*" Tim. ii. 15.

Child-bearing, so far from being a disease, comports well with perfect health, and often tends to prolong it; but yet a woman needs confidence in her Maker, that she may look forward in peace and joy to the period when she is to become a mother. The nervous apprehensions which many women experience often prove highly injurious both to themselves and their offspring. One who is not greatly deformed, and who does not compress herself with a tight corset, has scarcely a reason for fear, provided, of course, that other causes of disease are properly avoided. The evil of compressing the waist is the greatest next to bad air, indolence, and despondency. Since the public laws of our land do not, like those of the Romans and of Lycurgus, compel women to wear wide and loose clothing, it is the duty of husbands, if they can, to enact and enforce private laws to the same effect. Next in evil consequences to compression stands undue indulgences of all kinds, such as stimulating food and drink, inaction, and irritability of temper. A woman who has it in her power to take moderate and frequent exercise in the open air, may generally thus preserve herself from nervous distress and capriciousness of appetite, as well as maintain all the powers of nature in the state best adapted for

the fulfilment of their functions. After exercise, it is, however, very necessary to recline, so as to remove all pressure and weight from the spinal column. With precautions as to simplicity and sufficiency of diet, with free enjoyment of a cheerful sociality, pure air, exercise, and rest, the inconvenience of the gestative condition may be almost entirely removed, and the after-evils diminished to such a degree that no Life-assurance need demand a farthing additional premium on their account.

These matters vastly influence the well-being of the offspring; for, in fact, during a prolonged period mother and child form together but one living system, and whatever injures the mother's constitution also involves that of her progeny in the mischief, not only while they are, in the fullest sense, vitally united, but also when the infant is to absorb the breath of life for itself.

A mother, with a mother's heart, desires to nurse her own children, and there are many good reasons why she should;—she will be more likely to continue healthy and happy—she will be more likely to see a grown family in smiles around her—she will be more likely to secure lasting love, for a lovely woman is then the loveliest when cherishing the new being formed directly by the hand of God from her own body, and laid upon her bosom. The infant at its birth requires still to be nourished from the heart of its mother. It has experienced a violent change in its entrance on this breathing world; its blood is to be oxygenated and purified by the action of its own lungs; and the fluid best adapted to its state is that

which is nearest akin to the blood that has hitherto circulated in its veins. Even the warmth of its mother's body is the best for it. At all events, if it be not kept in a temperature very near that of its mother's body, it will rapidly sink, for a new born infant very quickly loses its warmth, its lungs being small in proportion to the circulation, and its power of absorbing oxygen approaching at first very nearly to that of a dormant animal, which indeed, for some time, it greatly resembles, except in the activity of its digestive functions. An infant kept warm, does not need food so frequently as when allowed to become cold. It has to be quickened into higher life by "tendering;" air, warmth, light, and food, are to coöperate in developing and sustaining an appropriate organism, that a living soul may stir in the limbs, search for good through all the senses, look out into the light of heaven, smile in its mother's face, and learn all the mysterious sympathies of conscious being.

But many women are not formed for the happiness of watching the soul's awakening; and some, alas! have been too artificially cultivated to be of any value as wives and mothers: their souls are lost in the solecisms of society, and they become conventionally unfit for anything but show. Yet among the higher classes are found the most exemplary of mothers, who unite with all the proper refinements of life, whatever is wise as well as delicate in its management. There are spoiled beings in all classes, and both sexes; but whether high or low, a nervous, excitable, feeble woman, incapable of exertion, or in

any respect unhappy in her duty, is not fit to suckle her baby. Many among the poor are reduced to this state by insufficient food, and by the miseries of vice, and want, and ill treatment ; and many among the rich are no less pitiable from causes equally deplorable, such as pampering, inactivity, excessive reading, social excitement, domestic disunion, and the disorders of indulged pride.

A nursing mother must devote both body and mind to her offspring ; and everything that violently disturbs her nervous system will render her unfit for her office. She must do her best to preserve a tranquil temper, and a good digestion ; and, if her constitution be not infirm, the mere circumstance of devoting herself to the mother's endearing duty will go far to insure the kindred blessings of a cheerful mind and a vigorous stomach, as well as lessen her liability to many common causes of weakness. Her food and drink should be simple and abundant, containing very little spice, and no direct stimulant.

Those women who have never taken any alcoholic or fermented liquors, usually have the best blood, and are the best nurses. Milk, sugar, weak black tea, oatmeal-porridge, or well-boiled pearl barley, a large proportion of potatoes, a moderate supply of meat, with plenty of good bread and butter, constitute the staple dietary of the healthiest mothers in the kingdom. The other substances which most tend to promote the production of milk, are white meats, such as the flesh of fowls and rabbits. Fish also favours this important object, but more particularly fresh-water fish, the best of which for

this purpose is said to be the pike. All powerful diuretics, or such things as provoke excessive action of the kidneys, should be avoided, and also everything inducing much perspiration, or causing undue relaxation. Mint, but particularly sage, vinegar, pickles, and all astringents and acids, diminish and deteriorate the milk, while all substances containing alkali in small quantity, but especially potash, tend to increase it. A few grains of bicarbonate of potash three or four times a day, in some mild bitter infusion, such as that of orange-peel, is very serviceable in increasing the quantity, and improving the quality of the milk ; and thus, too, by improving the mother's milk, it frequently cures the thrush, gripings, flatulence, and those feverish disorders so incident to infants that are badly fed. This experience accords well with theory, since we know that potash is essential to the formation of milk, and probably also to its perfect digestion. If, however, an undue quantity of alkali be taken, it wastes the vital force and the substance of the body. Narcotics, spirits, and mercurials, speedily evince their poisonous influence on the infant, if taken by its nurse.

That the mother's milk is the best food for the infant as long as the milk is healthy, it would be folly to dispute, seeing it is prepared for the purpose by unerring wisdom. The infant needs the breast a few hours after its birth. Its bowels are loaded with a peculiar substance named *meconium*, which generally requires a slight aperient for its removal, and the best aperient for the purpose, as a rule, is the mother's first milk. It is much more saline than milk under

other circumstances, and is doubtless elaborated with a curious nicety amidst the many wondrous sympathies of vital action then going on, as a provision exactly adapted to the first wants of the new being. In the present state of society, however, the mother's milk would sometimes convey death instead of life to her child, and a substitute must often be found; the best, of course, is furnished by the breast of a healthy woman, whose child is about the age of the nursling. The virtues of asses' milk are highly extolled, but, from experience, I should say it is very variable, and at best a bad substitute for human milk. The milk of a cow fed on grass, and hay, and fresh vegetables, quite new, with an equal quantity of good water, and with two drachms of white sugar, to every half-pint, given at a temperature of about 98°, from a bottle having a nipple with very fine holes, is the best substitute for the natural nourishment of a child from birth to its fourth or fifth month; after that, a little farinaceous substance and broth will be useful. Three or four grains of salt occasionally added to the milk is of great use. Many infants are destroyed by want of precaution in feeding them with milk. Ignorant persons are not aware that cow's milk is almost a solid in the stomach; and because it is easily swallowed, and the child seems craving for drink, nurses will often add to the distress of a stomach already distended with a mass of curd, by pouring down more milk, when a little pure water would be far more to the purpose. How often have I soothed a patient's babe to sleep by turning nurse myself, and dropping a few

spoonfuls of warm water upon the eager tongue of the helpless little creature. Even the barbarians of Africa have discovered that children are certainly far less liable to epidemics and other causes of disease while they are suckled. When Dr. Daniell asked the negro women of Warrée the reason why their children were not weaned until two or three years of age, he was told that by this means they acquired more vigour, and could better withstand the noxious exhalations from the swamps which they inhabit. They also remarked, that if the ordinary food of the adult were administered at too tender an age, the mortality of their children would be increased three-fold.

We who are instructed by the statistics of founding hospitals and workhouses can well appreciate the destructive effects of being deprived of the mother's breast; and yet multitudes of mothers amongst us voluntarily commit their offspring to hireling hands and ungenial bosoms. Yet we must not confound things that differ: when from necessary demands upon the mother's mind, or from bodily unfitness, her milk would be deficient or uncertain, it is well, if possible, to obtain the aid of a healthier breast, or even to bring the baby up by cautiously feeding it with prepared food, which we know may be so managed as to be perfectly consistent with the infant's health. Multitudes of mothers are reduced to extreme weakness by their anxiety to suckle their children when unfit for the fatiguing task; and in pity we would urge such to forego their efforts with

the certainty that neither their own hearts nor their neighbours' need condemn them.

As God commanded man to subdue the earth entirely to human uses ; as the earth, properly tilled, would furnish abundant food for perhaps a hundred times the number of its present inhabitants ; as neither heaven nor earth can be over-populated, political economists notwithstanding ; and as all children belong to Jesus Christ, and constitute an everlasting enlargement of parental life and relationship, there can be no good reason why their lives should be so layishly sacrificed as they are to the demons of ignorance and vice. They are organized to live in this world, their hearts beat, their lungs breathe ; they may be nourished ; their eyes are formed for light, their ears for sound ; they are constructed in keeping with earthly elements, their limbs might be developed and be subservient to the intelligent soul ; their lips might articulate words of thought and truth and love ; and by the right training of their sympathies the glory beheld by their angels in Heaven, might through them become visible on earth. Why, then, are they taken away ? Their Creator permits their entrance here to test and try the characters of those amongst whom they come ; and the obedience of society to Divine law is evinced just in proportion as the prosperity of childhood is considered and promoted ; and infants die so commonly to condemn human beings as generally unfit to foster humanity in its purest forms. When Christianity fulfils its mission, it will sanctify science,

and lay its healing, blessing hand on infancy, with a conviction that, to honour the Saviour, we must obey his laws as the Creator.

In London, a third of the whole population are cut off in early childhood; and throughout Europe about a quarter of the children born are destroyed by mismanagement within one year after their birth, and the Registrar-General, in his ninth report, states that in seven years, out of 23,523 children born in Manchester, 20,726 died within that period. In a parish in Scotland, according to Mr. Maclean's account of his visit to St. Kilda, in 1838, eight out of every ten children died between the eighth and twelfth day of their existence. There is every evidence that this terrible mortality arose from the heaps of manure and pools of noisomeness which characterized the village at that period as about the most offensive in that country. A similar mortality takes place in a low, impoverished part of Iceland, where the cabins are dirty and ill-aired. That *malaria* caused this destruction appears probable from the immense mortality that used generally to distinguish lying-in hospitals and workhouses, when formerly so badly managed. Thus Dr. Clarke found that in 1782 every sixth child born in the lying-in hospital of Dublin died convulsed within the first fortnight after its birth; but by attention to cleanliness, warmth, and ventilation, the present mortality in that institution is not a twentieth part of the former amount. The Giver of life has appointed means for its preservation, and we are not to attribute the evils with which we are familiarized to

providential appointment, but to the real causes, indifference and inattention to the Divine ordinances in nature, and to a want of will and wisdom to obey them. Any breach of God's laws is necessarily attended by just so much of misery as the fulfilment of that law would be accompanied by happiness. A century ago, twenty-three in every twenty-four infants born in the workhouses of London died under one year of age. Again, we ask whence this destruction of the innocents? The babes were received by hands untaught by reason or by love; the first instincts of nature were disregarded; there was no right exercise of thought; true science was asleep, and Christians were disputing about words and forms while the vital truth and spirit of the Gospel were not breathed, except by a few strange beings who, like Howard, deemed it a religious duty to purify the dungeon abodes of vice and wretchedness, and clothe the naked, and feed the hungry.

Why should not human mothers be as capable of rearing their young as wild beasts? Where mothers and fathers live morally together on the principles of common sense and good order, we see they succeed in raising large and healthy families. I knew a temperate and homely pair, in a small Devonshire village, who brought up three-and-twenty children to be men and women; and I have heard of another pair in the same neighbourhood who had twenty-seven, all well and active. Whence this contrast with the London workhouse fatality? Good sense and good feeling were at work in the country homes, and there were plain and wholesome diet, and pure

air and domestic comfort, all of which were wanting in the workhouses—and that is all.

The educated amongst us are now happily less artificial and more intelligent than formerly; but it is deplorable to witness the vast amount of household misery still perpetuated by ignorance or disregard of the few general facts as to what is right, and what is wrong in eating, in drinking, in indulgence, in exercise, in air, in sleep, and in temperature. With regard to the dieting and exercise of young children, there is much instruction to be gained from Dr. Alcott's treatise on vegetable diet. He states that in the Orphan Asylum of Albany, from 1829 to 1836, there was an average number of eighty children, and the deaths amounted to one every month; but a better management being adopted, not a single case of sickness took place for two years, and the superintendent stated that there had been a remarkable increase in strength and activity among the children, and also a change for the better in their temper. "They became less turbulent, irritable, peevish, and discontented, and far more manageable, gentle, peaceable, and kind to each other." All these benefits followed a little reasonable attention to their physical requirements. The diet was nutritious, but not stimulating, and consisted chiefly of bread and butter, and milk and water. The exercises were regular, suitable, and cheerful; all sudden transitions of temperature were avoided, and especial care was taken to obtain a full supply of sweet air in the sleeping apartments. In short, in order to ensure the general health of children not remarkably

predisposed to disease by hereditary taint, we have only to see that their food is suited to their age, their dwelling being dry, airy, moderately warm, and light; and that every encouragement consistent with order is given to that activity and cheerfulness which are so natural to all young creatures.

The training of children commences almost with their breathing; the instincts then begin to act, and these are in some measure manageable from the first, so that, with a proper organization, their indulgence shall conduce only to the right development of the body, and to the formation of habits compatible with the full exercise of expanding reason. It should be observed that, in childhood, the more marked tendency to disease arises from the following conditions:—1stly, A greater proportionate development and susceptibility of the nervous system, and hence predisposition to diseases of the brain, and to convulsions; 2ndly, The rapidity of the heart's action and arterial excitability, and hence a great liability to inflammatory and febrile disease on sudden changes of temperature, &c.; 3rdly, Great activity and development of the digestive system; hence the proneness to disorder of the bowels from improprieties of diet. These conditions very rapidly act and re-act on each other, so that disorder set up in any part of the system speedily involves all the functions; thus, whatever affects the brain and nerves, instantly evinces its influence on the heart and digestive organs; and any cause of disturbance acting directly on the stomach and bowels, quickly involves the nervous and san-

guineous systems. In short, children require especial care lest the balance between the brain and the heart should be disturbed, either by violent emotion, by weariness, by pain, by improprieties of diet, by impure air, or by cold or heat. Unless the treatment of children be conducted with a full understanding of their greater susceptibility to all the influences that can disturb life, their destruction must continue to furnish more than a moiety of the total mortality. The evil originates in the ignorance of parents on the one hand, and their vice on the other, both the vice and the ignorance being too generally the inevitable consequence of their social deprivation. But we need not here dwell on the random working of our natural affections when left without cultivation, or without fair scope for their development; it is enough to observe, that a woman of any understanding, although utterly destitute of all scientific appliances, will generally succeed under the guidance of her loving heart, in bringing up her children in health, where the means of health are afforded her. Her instincts are all alive to the wants of her offspring; even before its birth, she avoids irritants and ill-temper, and she takes care to keep her baby clean and warm, and to supply it with the most convenient food, if she can, from her own full bosom, until its teeth assure her that it needs more solid diet, when she will cautiously allow it to mumble a crust, or a bit of meat. A prosperous peasantry, "the country's pride," do not require treatises on diet and regimen to enable them to rear large families of good brood, solid, and hearty girls and boys,

who can work hard, and read the Bible; but a begrudging-race, who are starved on the soil they till, and cribbed without a comfort, in huts built as if on purpose to promote filth in every form, of course beget heirs of wretchedness to die in infancy, or to people the union-house with cripples and idiots.

The food best adapted to infants in preparation for more substantial aliment, is made by drying well-baked bread in a gentle heat, so as to form rusks. This should be broken down into a fine powder, and boiled for some hours, adding a little water occasionally, to prevent its becoming too thick. This, when strained and sweetened, and mixed with a little milk, is a most wholesome and nutritious food, but for children under six months old, it must be largely diluted. Baked or roasted flour, boiled well in water, and mixed with milk, and sweetened, is also a good food. These may be beneficially interchanged, and, in case the bowels are sluggish, or the digestion feeble, barley-water, or chicken or mutton-broth, or beef-tea, should be sometimes added to, or substituted for them. Biscuit-powder ought now and then to be substituted for bread. Above all, take care that the child is fed frequently, say once in three or four hours during the day, never waking it to be fed, and never giving too much at a time. An infant's stomach at birth will not hold a wine-glassful, but it may be soon enormously enlarged by over-indulgence, and a corresponding gluttony of appetite may be encouraged; but the probability is, that both appetite and digestion will become by this means thoroughly diseased, and pro-

ductive of incurable disorders. Excitement is the bane of infancy, as well as of age, and animal food must always be cautiously admitted into the diet of young children.

An infant's bowels should act freely and fully, at least once a day, and twice or thrice is not too often, provided the action be natural in appearance, and the appetite and supply of food be good. The *ejecta* should be of a bright yellow tinge when the child is living mostly on milk. When farinaceous and animal substances are taken, they naturally become darker and more consistent. The colouring matter of the bile should always appear, but not the bile itself. A green colour proves the presence of acid in the bowels, and commonly indicates that the food has been too much, too liquid, or of an improper kind. A white or clayey appearance shows that the bile is not produced as it should be, and the presence of slime is a proof of irritation in the lining membrane of the bowels. In this case a laxative is useful. A little calcined magnesia, with manna, or a teaspoonful of castor oil, is commonly a sufficient purgative; but the less mothers meddle with medicines the better. Let them study diet, and its natural adjuncts, and they will seldom find the doctor required, even to lance the gums; and the whole system, teeth included, will usually grow in due order, and without irritation, if the stomach be but fairly dealt with; or, if not, a better opinion than the mother's should be sought.

As soon as a child has teeth, it should be provided with something to chew. It is true that it

would continue to thrive on a full supply of good milk, but then it might do very well without teeth if milk were to be its only food. That the child may grow firm, and be gradually and at length fitted for business, which is the proper end of bodily strength, it must have food of closer texture and slower digestion than milk. Yet, for children from one to six years of age, a large proportion of milk in the food is desirable, other animal substances being too stimulating for habitual use at that period. There is no article of diet, however, that requires greater discretion in its habitual use than milk, especially in town, and many infantine diseases may be traced to its injudicious employment. Tumefied stomach, glandular swellings, enlarged liver, bilious feverishness, eruptions, worms, St. Vitus' Dance, and head-disorders, with all the concomitants of weakness and fretfulness, are often due to mismanagement in the use of milk. The evils might be all obviated by considering that a child needs both food and drink, and that cow's milk furnishes nothing to chew, and does not contain quite enough salt for the human body. It passes into the stomach too rapidly, and in a state that only suits a stomach well prepared for it. As Abernethy used to say, "Milk is very good for a calf." It, however, contains nearly all that is needed to form good blood, and it is only necessary to dilute it and to take with it a little salt, and something that requires mastication, in order to its agreeing well with the stomach of any child, and most adults. From pretty large general experience, and from the closer teaching derived from the observation

of my own children, all entirely suckled by their mother, I may confidently praise milk as an almost indispensable article of diet. My plan has been to allow one half new milk and one half water, sometimes a little sweetened, with a good supply of bread and butter, but I never allow the bread to be mixed with the milk, for a mass of milk and bread, especially if boiled together, and swallowed, as usual, without chewing, forms the hardest of all cheeses in the stomach.

In the treatment of the diseases of children, we often witness great advantage from substituting a little broth or beef-tea, for their usual milk diet; this probably arises more from the salt and water thus supplied them from the animal substance. Too great a use of salt, however, quickens the action of the heart, and over-stimulates the brain, causing first hastiness of temper, and then head-ache; ultimately it may lead to congestion, biliaryness, and fever; the natural remedies for which are slight change of diet, pure water, abstinence, and exercise.

Domestic cheerfulness is such an admirable help to digestion, that it is a rare thing for a happy child, properly fed, to fail either in activity or in appetite, except from epidemic causes. If anything goes wrong with the stomach, it will generally be found that the nervous system has been disturbed, and requires rest. It is astonishing how soon a young child gets over-excited, particularly in a warm room and in damp weather. On such occasions, some degree of febrile or catarrhal disorder or indigestion

is almost sure to follow. Then a slight alteration of diet is necessary, such as lessening the quantity of solid food, and increasing the drink. A small dose of citrate of potash, (lemon and kali) is a favourite and generally a sufficient medicine, in such case, in my own family.

Constipation is prevented by a slice of brown bread (bread with the finer portions of bran in it) once a-day. Children may be early taught to like this, and it is useful to the stomach in many respects, not only as an aperient, but as furnishing something beneficial to the blood.

Every child beyond a month old should be washed all over rapidly, with a large sponge and cold water, once a-day; the water should never be under 50°; and the skin should be immediately rubbed dry and quickly clothed. The shower-bath is only a shocking invention as respects children. The warm-bath, from 90° to 100°, is highly serviceable to weakly children, but they should never sit in it more than ten minutes, and be dried and dressed instantly, and be induced to take brisk exercise for a short time immediately after.

If mothers would but undertake the full management of their children, and exercise common sense in the matter, they would learn more from the experience of a few months in the nursery than from all the clever books in the world. But we must first learn to observe, and it is hoped that the few hints contained in these pages will enable such young mothers as may honour them with a perusal, to see

how far domestic hygiéne belongs to the long list of their sacred duties, and assist them in their endeavours so far to discharge them with honour and joy.

A few words concerning children beyond the nursery may properly conclude this chapter. First, as to *diet*, two words should suffice—stint not, stuff not. Three or four light, nutritious meals, should be taken daily, and one meal should have a good proportion of butcher's meat. Children brought up in town, or of a scrofulous habit, may need mild and fresh malt liquor, but those who enjoy good air and free exercise do better with pure water.

Let girls be allowed to exercise themselves as freely, and with dress as unrestraining, as boys, and they will grow up with straight and graceful backs. By the pitiful management of our mothers and grandmothers, one half of the females of this generation are crooked, and nearly all the rest weak and narrow-chested. Let girls trundle the hoop, now with the right hand, now with the left, for the body always curves towards the side most used. Battledore and shuttlecock, la grace, dumb-bells, chest-expanders, ball, are good exercises for girls, but nothing is superior to walking and running in the fields.

“Their liberal walks, save when the skies in rain,  
Or fogs relent, no season should confine,  
Or to the cloister'd gallery or arcade.”

Let them tire themselves thus, and then let them rest, as may be most comfortable, not by perching on a high, narrow seat, with a horrible upright back, but as they best can, on the reclining board, the

sofa, or even the floor. Nature indicates the propriety of reclining after exercise, as every savage knows, and thus, by obeying nature, relieves the spine and muscles, which would otherwise grow awry as readily in the forest as in the boarding-school. Every occupation requiring the use of both hands and eyes should be so contrived as to prevent continued stooping. Music, that "inflames, exalts, and ravishes the soul," is often made the cause of much misery to the body, "and wakes to horror the tremendous strings," by occupying the time that should be given to healthier exercise, or by boring and fatiguing a brain in no degree attuned to harmony, and therefore causing disgust and suffering, instead of exciting that pleasant state of feeling which, by fully rousing the heart and nerves, acts in some measure as a substitute for a joyous romp.

## CHAPTER XV.

### SCIENCE AND QUACKERY.

MAN is by nature a quack, disposed to discover and cure whatever may be wrong in anybody but himself, and ever ready with advice, partly to show his knowingness and good-will, and partly for what he can get. He loves to be looked at as a healer and helper possessed of a wonderful "medicine-bag," a collection of charms at war with the devil and all his works; and he at once assumes the possession of whatever faculty any one will give him credit for. But notwithstanding each one's fondness for his own mysteries, most people have still more faith in the mysteries of some other person. As Catlin informs us, concerning the Indians—"All tribes have their physicians, who are also medicine (or mystery) men. These professional gentlemen are worthies of the highest order in all tribes. They are regularly called in and paid as physicians, and many of them gain much celebrity in their nation. Their first prescriptions are roots and herbs, of which they have a great variety, and when these all fail, their

last resource is to mystery," or medicine, in the especial sense—in short, to conjuration and mighty magic, or the influence of bold tricks, promises, and delusions on the minds of their patients. Now, these mystery-men are remarkable for their great practical skill and experience; they have no reason to doubt their ability, for they often witness the good effects of their remedies. They can conscientiously sit on the top of their wigwams and vaunt to the multitude about the wonders of their art, and the surprising efficacy of their medicines; and if their patients die, they can assert the will of the Great Spirit as the direct cause of the catastrophe, without calling in question the potency of their potions and impositions.

Quackery is everywhere the same—quite a practical thing, and founded altogether on experience. As the mystery-man among the Indians derives a blind knowledge of herbs and roots from his fore-fathers, and adds a few odds and ends of his own invention if he has genius enough; so our routine-men and our self-applauding quacks are all very practical, and confident in the results of their own craft and experience; for have not the routiners seen many cures after calomel, black-draught, and so forth, and have not Morrison and Co. seen the same after their purging pills No. 1, and No. 2? A confidence in individual empiricism is the cause of all deceptions and mistakes; but science, rightly so called, is the true guide to practice, by requiring its conformity to established law, on the ground that without analogy there is no reason. If a man's

practice be founded on principles which cannot be so expounded that another may be able to apply the same means with equal benefit, his is just that kind of intelligence which can neither be taught nor learned, and therefore it has, it is clear, no relation to science, for "science is the knowledge of many, orderly and methodically arranged, so as to be attainable by one." There is no arrogance, no egotism, in science; and those who really follow truth, as the instructor of all who honestly inquire for intelligence, are at the same time learning the best lessons of humility. Whatever new truth may be discovered, fits in at once with all truths previously known, and it is, so to speak, but the detection of another unfolding or development of a principle always in action, and already acknowledged—an additional evidence of Divine wisdom in relation to our reason.

All quackery makes pretension to science, and, indeed, it always contains some little fragment of truth—some splinter capable of reflecting light, but it is so smothered up in fanciful wrappers and disguises, that, like the Indian's private idol, it becomes a thing without use, except to be boasted of. Thus, each master-quack has his own quackish truth, which becomes both a god and a property to him. He worships it alone, and expects others to bow to him for its sake, although they know nothing of it, but from his report. He calls his conceit an inspiration.

It is awful to think how readily a man in love with himself, and with some insane or isolated idea

reflecting himself, attributes his delusion to the inspiration of Heaven, and thinks truth his own private property. Thus, the most contradictory dogmas come recommended to us on assumed Divine authority, from the fifty-pill system to the infinitesimals; but while Hahnemann expressly asserts that in due time the Creator revealed to him the only true method of cure,\* the Hygiéist merely implies, that as sin introduced impurity into the blood of Adam and Eve, by Divine institution, so the Vegetable Pills are made known expressly in accordance with the laws of Divinity and nature, that they may purge the body of all acquired and inherited impurities, and thus cleanse the whole system of man by at once striking at the root of all diseases. And thus, every man who attaches himself to a notion, or sticks a bit of truth in such a manner in his mind that he cannot turn it about and see all its sides, is always appealing, like a madman, to experience and to Heaven; his appeal, however, should only have the effect of his being mercifully excluded from the society of those who are in their senses, until he have learnt to know his right place. As there is a common sense to which all who are sane may appeal as the rectifier of any odd opinion, so there is a common science to which all who are not mad appeal as the interpreter of any stray notions derived from solitary experience and the passion for hypothesis.

Observe the mystery-man, as described by Catlin —“He approaches with his body in a crouching

\* See Introduction to the Organon, sect. 2.

position, with a slow and tilting step—his body and head are entirely covered with the skin of a yellow bear, the head of which (his own head being inside it,) serves as a mask ; the huge claws of which, also, are dangling on his wrists and ankles ; in one hand he shakes a frightful rattle, and in the other brandishes his medicine-spear, or magic-wand ; to the rattling din and discord of all of which he adds the wild and startling jumps and yelps of the Indian, and the horrid and appalling grunts, and snarls, and growls of the grizzly bear, in ejaculatory and guttural incantations to the Good and Bad Spirits, in behalf of his patient.” It is, of course, the experience of such a wizard-physician, that many a desperate case is cured by his means ; he succeeds, and so he is content to go on with his practices, utterly without regard to the connexion between cause and effect, except as respects his plan and his pay. He is completely ignorant of the organization on which he acts, and of the relation between the agents he employs and the condition of the body in which they are to operate ; in fact, he has no science, but a vast deal of experience, and so he continues to act like a fool and a knave, very confident in his own discernment, and the stupidity of those who employ him. There are hundreds in England who practice on the same principles, and whose facts make a great show in medical literature, as it meets the common gaze in drug-shops, sealed pamphlets, and some periodicals. Facts, in short, are the foundation of all fallacies and falsehoods, for they become fancy-framed by mean intentions, and are always found to take just

the form that a selfish man wishes. But there are multitudes of very honest deceivers ready to avouch the truth of any marvel, not from their knowledge, but their ignorance, for ignorance always inclines to the superstitious modes of belief, and of practice. The only check upon this disposition is the diffusion of general knowledge, concerning both the mind and organism of man in relation to other beings.

The formation of learned classes is the means adopted by Divine Providence for the elevation and preservation of all classes. Men who are the most liberally gifted with ability to estimate the great facts of existence, to observe and to infer, are always the most honest in their motives; and while such men are really the God-directed promoters of civilization and of the liberty of truth, diffusing light by the free communication of their ideas, they are also as of course disposed to form learned fellowships and societies for mutual improvement; and thus, by the uniting spirit of unselfish coöperation, are made the natural and necessary enemies of quackery in every shape.

Disease makes the most imperative claim upon attention, and hence, in all countries, and in all ages not thoroughly darkened, men are found who devote their faculties chiefly to the investigation of bodily disorders and their remedies. Such persons, guided by preceding light, and comparing instance with instance, case with case, gradually acquire a tact in their inquiry, which enables them pretty successfully to discriminate between the various aspects of disease, and to judge of the action of

medicines on the body. They are not content with isolated intelligence, but endeavour to combine the knowledge possessed by others with their own, so as to constitute a science which, resting on evidences equally patent and plain to all minds that equally observe them, is consistent throughout, and grows like a tree, which, however numerous its branches, and whatever the degree of its development, is still a unity in itself, and in keeping with the Divine order of things. The laws of nature, interpreted aright, are those of wisdom, and they strip us of our conceits; but the foolish of all classes overlook those laws, and substitute their own self-opinion instead, and therefore such persons are always as hasty in getting wrong as they are obstinate in remaining so.

As nature is constant, science may grow, but cannot otherwise be altered, and what was true two thousand years ago is true to-day. Hence the descriptions of disease given by Hippocrates may be recognised by discerning students in every hospital; and although modern appliances may be improvements upon those in use in ancient Egypt and Greece, yet they are employed still on the same principles, and if with greater success, it is only because they are applied still more scientifically. There may be opinions on unsettled points, but not on first principles; we may dispute about theories, but not about facts palpable to all observers, and it is on these that science is founded. As in pure Christianity there is no sectarianism, but all true believers equally believe the cardinal doctrines, so

a man of science in England admits the same truths as a man of science in Italy, because truths commend themselves to all who will attend to them, and rest not on the dictation or assumption of any man, or set of men. The man who possesses a truth does not say, Take my word for it, but he says, Try it; he appeals to the evidence of reason, and the keeping of things. There is thus an orthodoxy in all truth, and an *ecclesia*—so to say—a band of faithful men founded on a rock, against which the audacious and the false prevail not. When a man feels himself actuated by the true and universal spirit, he owns the brotherhood belonging to it, and cannot act in a detached manner like an impostor or a quack. It may be said, science has no Bible; but it has. The works of God are all sacred books, to be read by all enlightened minds and honest hearts. As all that can be known concerning spiritual things is learned from revelation, so all that we can know of natural agencies, is acquired by our mutual coöperation in investigating nature; but a pragmatical man gives himself no trouble to keep step with others, but sets up for himself with a good stock of conceits and prescriptions.

It is but reasonable that men of education, who submit themselves to the tuition of approved teachers, and prepare themselves to be publicly tested, and for the most part conscientiously devote their faculties to their calling, should be better qualified to detect and to treat disease than those who, inspired by a whim, suddenly assume that they are doctors. True learning is of slow growth, but it is as sure in

its way as faith ; and real science is a teacher of humility as well as of confidence, while philosophy, rightly so named, is always devout, and well knows, that, as he who seeks the physician without seeking Divine aid, despises the Giver while he uses the gift, so that physician is but a profane person who imagines he can be successful without being God's minister, by learning his laws and obeying them.

This is the era of knowledge, and where true knowledge is wanting, knowingness and pretension take its place, so that all who are not well grounded in the first principles of natural and revealed truth are utterly exposed to the imposition of those who lurk on every hand to take advantage of the ignorant. And those who are not busy in acquiring knowledge and applying it, are busy-bodies still, though in matters beyond their vocation, and therefore involving their condemnation in proportion to their activity in meddling. The man who, from want of faculty, or of will, cannot classify facts, must be destitute of the philosophical *animus*, and can never gain much from experience, and therefore such a man can be a physician only in name, being no more fit to be trusted to treat the diseased body than he who is only a cobbler, because he cannot observe enough to make shoes, is fit to repair a chronometer of which he knows nothing.

Still a man may possess immense knowledge, and only find it in his way—

“ Knowledge and wisdom, far from being one,  
Have oftentimes no connexion.”

Wisdom only can use knowledge.

Medical science is not like any other, it has to do with vital influences, the changes of which cannot be exactly calculated by man, and yet the physician's general success depends on the sagacity with which he watches and anticipates those changes, and it is almost always proportioned to the skill with which he adapts his measures to foreseen results. Hence a skilful practitioner evinces a tact in his treatment of disease very far superior to anything taught in books. This tact can be acquired only during the active and vigorous youth of the mind, more particularly by familiar acquaintance with those extensive modifications of malady and treatment which hospitals and similar institutions present to those who are vigilantly bent upon obtaining knowledge.

As in this country some degree of qualified medical skill is generally within reach of even the poorest, the signs and treatment of disease occupy but a small space in this volume. My object is to point to the principles of remedy, and to show that the simplest means of cure are, on the whole, most efficient, or rather, as the poet says—

“Whate'er is best administered, is best.”

Give a man of tact and judgment the means of controlling temperature, and supplying good air, food, and drink, with mental quiet, and he will ask for few drugs. A good physiologist, practically acquainted with the habits of disease, resorts to medicines only as aids to nature, and to help out the action of those agencies by which all the functions are kept in order, or restored to equilibrium when

disturbed. The means adopted act as remedies only because they are employed in keeping with the condition in which the patient may be at the time; under other conditions, they would not be remedial. This is a truism, but it is constantly disregarded.

Cure is founded on the nature of the body in relation to mind, life, and matter; and to swallow medicines without an understanding of what is needed, is more likely to aggravate than to alleviate disorder. Practical medicine is based on practical acquaintance with the action of medicinal agents on natural function; and as no function is solitary, but all the organs of the body are associated and influenced one by the other, so if one organ be diseased, all the body suffers with it; and as any local disease, unchecked, produces death, so any medicine that acts on any function must more or less affect all. Thus we see that, strictly speaking, there can be no specific medicines, or remedies limited in their action to specific ailments, and he who pretends to the possession of such means, is an impostor. So also is he who pretends to any secret means of curing disease; truth and science wear no disguises, and court the light rather than darkness. Real professors of medicine make no mystery of their business, and we may confidently affirm, with the great Dr. Johnson, that "Where secrecy or mystery is found, roguery is not far off." Every qualified practitioner of medicine in Great Britain is bound by oath, or solemn declaration, to act honourably and openly; and it is the practice of the profession publicly to discuss in their societies, or in their

periodicals, whatever may promise advantage to the public health.

There are, however, some men belonging to the profession who disgrace it; but they would not be allowed to assume its honours, if ignorance were not so common, and the laws so defective. But, alas! vulgar minds acknowledge no success but in show, and medical charlatanry everywhere finds a ready market, because, like the mountebank at the fair, it deals out its wonders according to the credulity around it.

Do you say, how are we to distinguish a charlatan from an honest gentleman? "By their fruits you shall know them." How do you judge of a tradesman? Perhaps you may say, By his goods. Not so exactly; but if he puffs, you suspect him. So if a presumed doctor gives out that he possesses superior means, or does business in a way peculiar to himself, or a club of his own, depend on it he means to cheat you if he can. The principles of truth are fixed and open, and admit of no private interpretation: what they are to one, they are to all who understand them. A man may honestly endeavour to excel his neighbours, but if he tries to excel in anything showy, and not in mere duty, he is a cheat. If you are still at a loss, seek the least pretending man you can find, for if he cannot cure you, he will say, Try another. When Garth was on his death-bed, a nobleman, whose physician he had been, selfishly entreated him to say what doctor should be consulted when he was gone. After many messages of kind inquiry, ending in the same request, Garth

almost with his last breath replied, "Send for the nearest." This is not bad advice. Still a glance at the "Medical Directory" will do no harm, as there you may find an epitome of ostensible qualifications.

A truly scientific man is distinguished by the modesty with which he conducts inquiry, the caution with which he forms an opinion, and the decision, patience, and straight-forward steadiness with which he acts up to his conviction, and carries out the principles known to be true. He will not suppose you are so ignorant as not to be aware that what he knows any one might know by study. One who sees his way, and why he is in it, does not take uncertain steps, nor hesitate to proceed; he has an end in view which he is sure can be arrived at only by going right on. The experienced and philosophical practitioner is not confident in notions, but in truths, which all others may see if they will; he does not addict himself to incongruous hypotheses, nor amuse himself by constructing dreams out of fragments of facts, and then acting on them as if they were oracles. Neither does he behave as if he were infallible, but he follows up the sure footing he has so far attained, with the consciousness that great care is always necessary to succeed in a path so intricate and dark as that which disease often pursues.

As ignorance is of two kinds—the acute and the chronic—so there are two kinds of dangerous doctors—the dashing and the dull. They are probably about equal in danger, though the acute case is certainly the more deplorable. Men subject to this form of ignorance are always talking of the fallacies

of other minds, but incapable of perceiving the egregious blunders of their own. They deprecate the experience of all past ages, and trust only to what they can pick up for themselves, as if they expected to be dignified by despising what they cannot understand. They forget that he who learns not from others is likely to be more singular for the degree of his folly than his wisdom; and that one who always flatters himself will soon be glorious in no eyes but his own, or those whom he may have infected with his own folly. Such men arise like *ignes fatui* from the corruptions of society, and glitter and delude and perish in rapid succession. They would attract no attention but for the darkness around them; still as they never attract without diffusing mischief among those who approach them, it is important that ignorant persons should be instructed to distinguish the steady lights of science from the mere jack-o'-lanterns of pretension.

The genus quack consists of numerous species; but all have that family likeness which might naturally be expected, from their being all descended from "the father of lies." As specimens of each of them are daily advertised in the newspapers, it would be a waste of time to describe them all here; but a few minutes may not be lost if we indulge in a glimpse at two or three of the more respectable of them. We pass over the glaring falsities of the numerous degenerate Jews about town, direct descendants of Judas and Barabbas, who assume the names of good men and true, and exhort the world to swallow their unfailing wafers, pills, lozenges,

and lies—to use their miraculous ointments, to set infirmity and death at defiance by potions and powders of unknown power,—to be cured of all ailments for a few shillings, under the sanction of a government stamp,—to be saved from fear of shame and the grave by a consultation fee, per post, or to be delivered of all their trouble by a call at the house of the firm, with a private door. All these we pass as too black to be dealt with, for he who handleth pitch shall be defiled—

“ Their faults are open,  
Arrest them to the answer of the law,  
And God acquit them of their practices.”

But it is lamentable that the truly benevolent, who would be so noble but for ignorance, often give themselves up to the delusions of quackery with a credulity that throws suspicion on their creed. I once encountered a Lady Bountiful who, with a sweet smile, devout concern, and admirable derangement, endeavoured to prevail on me to prescribe the all-purifying vegetable pills, on the ground of their miraculous effects, suggesting the probability of their being compounded of the leaves of the trees for the healing of the nations. But as I had seen sufficient proof that these rough blessings in disguise were calculated to make a new man of one by turning him inside out, rather than by improving his constitution in an angelic manner, I preferred to employ gamboge, aloes, senna, and cream of tartar, in a more legitimate and safer way, if needed at all, than as they are given in the universal medicines. Another good soul, with a nose like the torch of St.

Anthony, permanently cured multitudes of the poor about her neighbourhood, babies and all, by large supplies of brandy and salt, and to prove the innocence of the mixture, took it freely herself.

These coarse mistakes are now but little in vogue, except in the back settlements of society, and a far more refined and specious system of specifics has taken their place under the auspices of professional knight-errants, and the Don Quixotes of physic.

In a former part of this volume, John Wesley has been referred to, as a good example of what temperance and serene activity will accomplish towards securing health and prolonging life; but he might also be quoted as the foremost and purest among benevolent quacks; and, perhaps, as a proof that Carlyle was a little out of order, when he said that "Quack and Dupe, as we must ever keep in mind, are upper-side and under of the self-same substance—convertible personages." Wesley wrote an odd little book, entitled "Primitive Physic," in which many of the remedies advised are very primitive indeed. Most of them are said to have been tried, but if they were tried on himself, his long life was indeed a miracle. "For the bite of a mad dog," he says, "Plunge into cold water daily for twenty days, and keep under as long as possible. This," he adds, "has cured even after the hydrophobia has begun;" from which we must infer that it usually cured hydrophobia before it existed! "For pleurisy, take a drachm of soot!" "For asthma, live a fortnight on boiled carrots; this seldom fails." "For cancer, stamp wild parsnips, and apply as a plaster every

twelve hours ; this usually cures in a few weeks." "In raging madness, set the patient with his head under a great water-fall." Such are favourable specimens of the random remedies of "Primitive Physic;" in boldness and vagueness, they are not unworthy of more modern times, and in honest simplicity far superior to most. From this odd book a practical physician will gather many useful hints, since it is a *melange* of crudities gathered with equal hand from philosophers and fools.

A Christian physician will feel his responsibility, and the Christian who knows nothing of physic, of course feels for his suffering neighbours, and will prove his Christianity by confessing his ignorance where he has reason to feel it, and, instead of meddling with medicine, he will do his best to obtain for the poor the skill and care of instructed, sober and judicious men, who shall be properly paid for their perilous toil and anxious application. Such remarks are not without force, now that pious persons are unwisely adopting, with more than ordinary enthusiasm, the more snug, and compact, and semi-scientific quackeries of the day.

Hydropathy, homœopathy, mesmerism, or any other mystery of benevolence, may be perfectly well founded, and very honestly studied and practised by any professional man ; for what is new is often true, and all truth is new to the ignorant. A vast deal of truth of a valuable kind is to be met with in bye-ways ; but then they are not to be deemed exclusively true, only because they happened not to be seen except in a straggling manner. Let men who

think they discover advantages in any peculiar system bring their facts to the common stock, that they may pass for what they are worth, and not set a nominal value on them according to his own partiality. Any new system, when it becomes the vogue, is but an extensive mode of experimenting on human nature. The practice may be good or bad, but it is either one or the other only by comparison, since no system is exclusively perfect that we know of. The admirers of this or that system are not to be blamed, unless they impose their art in the place of science, and abuse others to aggrandise themselves. There is no character more despicable than the professional Pharisee, who thanks God for his exemption from error, while he sets down all but himself and his sect as egregious sinners.

Mistakes tend to confirm truth, but surely that is no reason why

“ The better act of purposes mistook  
Is to mistake again ; though indirect,  
Yet indirection thereby grows direct,  
And falsehoods falsehoods cure ; as fire cools fire,  
Within the scorched veins of one new burned.”

By the bye, these words of our Shakspeare are rather like an anticipation of homœopathy, as described by some physiologists. A very comical book might be written on the vagaries of the best of us, but it is no pleasant thing to be laughed at ; besides, what seems ridiculous in other eyes, is a serious matter in our own. We might laugh at the homœopathists, if they were not, many of them, such excellent persons, and so provokingly incapable of seeing their

own mistakes, however plainly pointed out, perhaps because they are so busy with their microscopes in magnifying the mistakes of others. It would be a pleasant pastime, doubtless, just in a friendly way, to turn the microscope towards their own pericrania, and to describe their productions. But it is unneighbourly to pry too closely; and as they are doing much good, and will do more in spite of their mistakes, we will wait our opportunity, and meanwhile learn what we can of them. There are those among them whom it would be an honour to call our friends, and they are grieved in soul to find themselves associated with scamps.

It is homœopathy that now chiefly bewitches the benevolent quack, and there is much in the system incidentally calculated to recommend it to the notice of outside philanthropists, such as marvellous cures, mysterious theories, words like magic spells, agencies that can neither be tested nor detected, spiritualized medicines that cure, but cannot kill, specifics by the dozen for all diseases, which all are comprised in itch, scrofula, and syphilis. It is compendious in its theory, it is perfect in its practice. How manageable an infinitesimal dose must be: "I have *often* seen," says Hahnemann, "a single drop of the tincture of nux vomica of a decillionth degree of dilution produce exactly half the effect of another at the quintillionth degree, when I administered both one and the other to the same individual, and under the same circumstances!" Wonderful man! Only think of the simplicity of a genius that, after twelve years study, succeeds in tracing all our worse maladies to

that "ancient miasm," as he calls it, the itch. All forms of madness, all pains, all spasms, all nervous diseases, gout, and *gutta serena*, *fungus hæmatodes*, cancer, and the stomach-ache, he expressly refers to itch. Alas for genius ! alas ! that itch should now be proved to be produced by an insect, that can be smothered by stopping up its burrow with hogs' lard ! The "ancient miasm" is an ugly mite !

Let any one of moderate sense read over the 275 symptoms said to be produced by *nux vomica*, or the 272 of *chamomilla*, as stated in the "*Fragmenta de Viribus*," and he will scarcely fail, if not blindfolded by theory, to see, that whatever may occur after a dose of either would, as a matter of course, be attributed to it. Are the facts and the rest of the theory better grounded than the ancient miasm ? But we are getting into the discussion of a subject to which it was intended only to allude.

It is a consolation to know that homœopathic medicines cannot poison, even by mistake, and that no one ever was or ever will be tempted to resort to them in order to commit suicide or murder; but since I cannot find, after fifteen years' observation, that they positively influence any function of the body, but that a judicious dose of ordinary medicine does, I may reasonably prefer measurable and appreciable medicaments, more especially since Nature, even in her impregnations and fermentations, operates not by infinite dilutions. Moreover, as medicines do not act as fermentes by producing in the body more substances like themselves, as the theory requires, we are rather disposed to " learn of the

beasts the (substantial) physic of the field," than to study "spiritual dynamics," at the homœopathic hospital. However, we thank the homœopathists, with all our heart, for their facts, as they teach us the importance of doing nothing to thwart Nature in her efforts to cure disease, and, above all, show us the wisdom of avoiding violent reactions.

To the hydropathists, too, we are indebted for much valuable instruction of a positive kind. Under the management of the clear-seeing Priesnitz, and others like him, the water-treatment is well calculated to cure many of those maladies so abundantly generated among the idlers of fashion and the slaves of commerce. It cannot, however, be very conveniently applied to the poor—it is expensive—so they are not invited to hydropathic establishments, although all who can pay in cash, as well as praise and gratitude, are heartily welcome.

The Mesmerists, too, are doing good service to science by directing attention to influences beyond the apothecary's shop, and if they at last only succeed in proving that the cure of disease, even of chronic and obstinate inveteracy, is often accomplished by diverting the mind from its bad habits, yet this much is worth all that it costs; and perhaps the possibility of this could not be sufficiently enforced on a profession rather addicted to formulæ without an enthusiasm sometimes overstepping the boundary of prudence.

It behoves us, however, to deal tenderly with each other's convictions, while, at the same time, we boldly express what we believe to be useful as well

as true. Far be it from me to deprecate any means scientifically directed to the amelioration of suffering, but the fear is, lest the crafty should lie in wait to deceive the unwary under shelter of names, and that the race of “mystery-men” should prosper, because they make up in boldness what they lack in wisdom.

Those who take up new notions and find them repudiated by the profession, are in the habit of proclaiming themselves as persecuted martyrs of science, and at once compare themselves with Harvey and Jenner; but they seem to forget that these were great men, who encountered prejudice in the right way, not by appealing to the ignorant, who could not judge of their claims, but by addressing their arguments to their professional brethren, and hence the truth of their views was soon universally admitted by scientific minds. Honest and noble purpose trumpets not its merits where it may hope for pay, but presents them where they may be proved. Hydropathists, homœopathists, mesmerists, hygiéists, proceed thus, and if you advance truth, your triumph will be complete.

“Things at the worse will cease, or else climb upwards.”

SHAKSPEARE.

## CHAPTER XVI.

### THE ART OF HEALING IN SOME OF ITS PRINCIPLES AND APPLIANCES.

WE can easily understand that the power by which the body is developed is born with it, and belongs to it. We can also readily comprehend, that the repairing power of the body is the same as that by which it is preserved in health. The flesh being wounded, a demand is made upon the blood-vessels and nerves of the part, and a new action is produced, the end of which is the reparation of the injury; but if the action be excessive, the evil is aggravated instead of repaired. The healing power, or *vis medicatrix naturæ*, is more limited in man than in many animals; we, for instance, never recover a lost limb, as a lobster does; still it is the same power that is at work in the healing of a cut, or in the cure of any malady, and it only needs to be rightly seconded by art and reason, or to be placed in favourable circumstances, and furnished with the materials to work with, and all that is possible, in the present order of things, by way of recovery, will

be effected. If the curative power does not reside in the body, then it must be added or created when a remedy is administered, but that is absurd.

Disease, then, is not cured by the doctor and his drugs, but by the innate tendency of the living organism to recover from disorder when the cause of the disorder is removed, and to resist that cause as long as circumstances will allow. It is vital action that kills or cures. This action may be stimulated or checked by medical art. There is an antagonism between life and disease, but yet disease results from the over-action of life, and it is the business of the physician to direct all the means at his disposal in such a manner as to favour the steady operation of vital forces.

The healthy state is not restored on chemical or mechanical principles, for a chemical agent does not act in the living economy merely as a chemical, but its action is modified by life, or that power which preserves the equipoise of function in health, and tends to restore it in disease. The balance depends on the mutual relation between all the organs of the body; but the functions most immediately concerned in preventing and curing vital disturbance are those of the stomach, the heart, the lungs, and the nervous system. Whenever there is disease the secretions and excretions are in some degree changed from their normal or natural condition, and it is by changes in these respects that any disorder is removed. Every alteration in the state of life affects the relation between the respiration, the state of the blood, and the action of the nerves; and every

change in either of these influences the others also, and indeed so far modifies every function of the body. It is plain, therefore, that health and disease proceed on vital principles, and that to prevent disease is to preserve natural order, and to cure it is to remove causes of disturbance, and to restore appropriate action.

The observation of living phenomena proves the folly of attempting to cure by specific remedies, as if every symptom or ailment were an individual and detached element, to be neutralized by some other aptly administered, and not a condition of organization, more or less involving the whole system, and to be treated not on partial but on general principles. The ignorant deal very largely in specifics, but their ideas of disease and of remedy being alike indistinct, they talk and act like drunkards and madmen, who may doubtless be very sincere in their opinions, but are not likely to persuade any to follow their advice but those who are as mad as themselves.

The means most highly advantageous in one case of the same disease would be equally dangerous in another, since it may exist in bodies under extreme differences of condition. Thus, a loss of blood, that will quickly cure inflammation in one patient, will destroy life in another, and a grain of medicine that in one state of the blood would cure, in another would kill. Even the effects of a poison are not to be cured by a mere antidote. The poison itself, as, for instance, a mineral acid, may be neutralized by an alkali, or removed from the stomach by the pump, or an emetic, nevertheless its effects remain in the

vital disturbance which it excited in the blood and the nerves. The disordered action set up by the poison in the vital functions, has to be rectified as well as the poison removed; but it is manifest that this can be effected only by a power resident in the organs disordered, and these cannot be assisted but by attention to the particular and general requirements of the system. Concerning these requirements no one can so well judge as he who has experience of disease in its varied forms, a good knowledge of physiology, and a good share of common sense, and a disposition calmly to exercise his faculties.

The action of medicines, as well as of disease is, for the most part, expended on the blood. We have seen that the elements of life and function, the moving force, as well as the repairing faculty of the machinery, reside in the blood; and the blood's health mainly depends on the materials introduced into it, since, according to the fitness of its contents for the purposes of life, all the functions are either stimulated or depressed. There can be no need, therefore, of farther argument, to prove the propriety of regarding the condition of the blood in the treatment of disease, whether by diet or by medicines. Food, drink, and drugs, influence the blood almost as much as the lancet would do, and we may as readily be destroyed by mismanagement of the one as the other. Where the patient is strong, and the functions of the stomach active, great liberties may be taken with the blood, but where disease has a chronic hold, or much power, he is the best practitioner who best husbands the vital fluid and deals

with it on those firm, gentle, steady principles, by which life itself is carried on in the body.

Like all powerful agencies, the loss of blood is powerful either for good or evil, and it is liable to abuse in proportion to its power. The ignorant abuse it in two ways, either by asserting its effects to be more beneficial than they are, or by affirming that it is always injurious. The latter class are now becoming so far predominant, that a physician who prescribes a few leeches, or a small bleeding, is looked on with suspicion. But no one of experience can doubt, that blood-letting has often promptly and safely arrested a pleurisy that would otherwise have been fatal, or checked an inflammation of the eye that would otherwise have produced blindness. It is painful to think of the extravagance of enthusiasts; for whether they preach abstinence or indulgence, they are ever ready to run into extremes, from which return to temperance and moderation is alike difficult. What a pity it is that men are subject to such a glow-worm illumination that they can behold no light but their own; so that the stars of heaven shall afford them no guidance, and, when the sun shines, they hide their heads.

Do not be frightened out of your propriety, should your medical attendant propose to control acute disease with the lancet. If he is a man of sense he does not need your opinion to guide him, and if he be not, you ought to choose one who is. There is no reason why fools and knaves should not be driven out of any profession to get their living as they may, without risking the lives and happiness of

others ; and he who does not understand and act on the principle of doing as he would be done by, plots only for his sordid ends, whatever his profession or his titles.

If a man of thought and experience advise blood-letting, depend on it, he will be moderate ; he has used his eyes in a thousand cases, and his judgment does not depend on popular whims and disparagements, but is enlightened a little by what he has witnessed ; and the practical wisdom of past ages is not quite thrown away on him. He who knows what he is about, draws blood only to save power. Yes, but you will say, “ The wise physician treats the healing power of nature as the sun-flower the sun ; he follows it until it becomes invisible.” True ; and nature herself points to the removal of blood as the means of relieving excessive functional action. It is true, nevertheless, that the lancet has often been resorted to in a most empirical and clownish manner, and so has every remedy ; but this fact only proves the necessity of a cultivated judgment, in order safely to employ the best appliances of art. It is the ignorant abuse of blessings that converts them into bane. By considering the relation between the condition of the blood-vessels, and the nerves in various disorders, the manner in which the quantity of blood may influence function will become apparent.

Congestion, inflammation, and irritation, are words that very frequently occur in descriptions of disease, but there are few words less understood. In order to perceive their meaning, we must consider the

nature of the capillary circulation. The blood passes on through an organ, say the liver, not merely from the force of the heart driving it forward, but because there is an attraction between the blood and the substance of the organ, which attraction is increased in proportion to the activity with which the organ performs its function. For instance, in the case of the liver, the circulation of the blood through it will be influenced by the rapidity with which the bile is secreted. This may perhaps be elucidated by the burning of a candle: we may call the flame the product of secretion, the wick the secreting organ, and the dissolved tallow the blood. We see that the capillary flow of tallow in the wick is proportioned to the degree of flame produced; if anything obstructs the formation of flame, as when the candle wants snuffing, congestion, so to say, takes place, and the melted grease, instead of being absorbed, is accumulated, and runs to waste. But comparisons are incomplete, because no two kinds of process quite resemble each other, and to render the comparison perfect the wick should have the power of expanding, and be reproduced by tallow as fast as consumed, just as the substance of the liver is reproduced from the blood that circulates in it, and is pressed on by the heart. *Active congestion*, or determination of blood, is attended by an increased demand for blood, in consequence of greater functional action or excitement, and in this case the arteries enlarge. This state probably approaches to the nature of inflammation, but is distinguished from it by being merely an increase of action, while

inflammation is attended by a change in the nature of the action, and a local stagnation of blood surrounded by active congestion. *Passive congestion* is a retardation and accumulation of blood in consequence of deficient energy in the function of a part, or diminution of the proper nerve-action. In short, as Dr. Billing says, Nerve, in relation to disease, is nothing without capillaries—capillaries nothing without nerves.

Now, the methods of cure in the two kinds of congestion are as opposite as their causes: in active congestion the supply of blood is to be lessened, but in passive congestion secretion is to be increased, and tone improved. In some cases it is requisite to combine both modes of treatment, for there may be active congestion in one part, and passive in another.

*Inflammation* results from a change in the process by which the materials of the blood are converted into the substance of an organ; and it seems to depend, in the first place, on a diminution of nerve-power or action in the capillary blood-vessels, which relax and enlarge, thus admitting more blood than in their healthy state the force of the heart would press into them. We must remember that the capillaries have the faculty of contracting under the stimulation of nerve-action, and that their contractile power, together with the elasticity of the arteries, naturally balance, as we may say, the force of the heart. This balance is disturbed in an inflamed part to a greater extent than in congestion. One remarkable effect of this change is an increase of

fibrine in the blood. The power of appropriating the nutritive elements is obstructed, the white globules accumulate, and plastic lymph is effused in the inflamed organ, the vitality of which is depressed; and if the disease proceed, an unorganizable substance, pus, is deposited, and the part is said to suppurate. If the pus be produced in a cavity caused by the inflammation, an abscess is formed; it may also be thrown out like a secretion on any inflamed surface. *Ulceration* is a superficial disorganization, and *gangrene* or *mortification* is the death of the tissue resulting from inflammation or from the obstruction of the vessels supplying the part with blood.

Inflammation is usually accompanied by a curative action, the plastic lymph thrown out having a tendency to limit the disease, and to promote the healing of injured parts. The object in injuries is to prevent so great an inflammation as would cause the production of pus instead of plastic lymph. This is best effected by keeping the air excluded from the injured part, preserving the part *cool* but not cold, and quite at rest. In short, wherever inflammation occurs, the method of cure consists in preventing too great a determination of blood to the weakened vessels of the part affected, while, at the same time, such measures are adopted as tend to improve the tone of those vessels.

*Irritation* is a most indefinite term, and it is now applied to all disorders, from a flea-bite to hydrophobia. It will help us to define the word in our own minds if we consider that every part of the body

is endowed with a certain degree of impressibility or a certain power of action in correspondence with certain natural stimuli or provocatives to action. Now, in every part and function there must be an average or healthy state of action, and what is more or less than this is so far disease. The healthy skin, for instance, bears certain degrees of heat or cold without injury, but its susceptibility may be so increased that the slightest change of temperature, or the contact of the mildest irritant, shall cause it to be sore. This morbid impressibility may occur in any organ of the body, and we may regard it either as a diminished resistance to impression or a greater readiness to act under its influence. Practically, a state of excessive irritation may be safely viewed as an increase of arterial and nervous intensity, with a diminution of general power. As vital excitement commences in the extreme fibrils of the nerves, it may be propagated through nervous sympathy, from one part to others, or even to the whole system; in short, according to the extent and seat of the irritation is the general disturbance, since, whenever it occurs, the circulation, the respiration, and the nutritive and secreting processes, are always involved. Thus, we have irritation of the stomach, from weakness or from indigestible food; irritation of the brain, from over-thinking, exhaustion, or stimulants; and the irritation of any nerve producing exaggerated sensation, or excessive activity of function; whence it is plain that from the mutual relation of function all local irritation must exert a general or constitutional influence, and that to cure any considerable local dis-

order the state of the whole body must be considered. Wherever there is inordinate action there is irritation, but excess of action in one organ may diminish the activity of another. Thus, irritation of the stomach often produces suppression of bile, and sluggishness of brain. The cure of irritation is to be sought by removing its cause, by soothing and then by strengthening. To exemplify this we will suppose an attack of English cholera, vomiting, biliary diarrhoea, and griping, from having taken a full meal immediately after some exhausting exercise, or while in a state of lassitude from heat of atmosphere. Here the irritated stomach and bowels act excessively to get rid of the irritating cause. Now, the treatment required is not to prevent this action, but to moderate it when in excess, and to aid it when insufficient. A mild purgative, such as rhubarb or castor-oil, usually alters the action in a short time, and the disturbance is often subdued by a free use of mild drinks alone. But an irritant is not to be always removed from the bowels by a purgative, the purgative, in fact, may only increase the disorder, thus, in colic, the bands of muscles in the great intestine, the colon, being irritated, contract on the accumulated contents in an irregular and excessive manner, so that, in order to relieve it, it is usually necessary to combine a soothing medicine with an aperient; and a dose of opium, by relaxing the irritated muscles, will often open the bowels where a simple purgative would fail. Where the excessive irritation continues after the exciting cause is removed, expe-

rience in such a case teaches us the value of sooth-ing measures, such as slight opiates, to be followed by cordial tonics, such as some aromatic bitter infusion, always remembering that the true tonic is good and well-digested food, and that no remedy is efficient without repose of the organs of mind and emotion—the brain and nerves.

Every kind of morbid irritation is to be treated on the same principles—remove the cause, tranquillize, and strengthen.

*Pain and spasm* are the highest forms of irritation. The most efficient means of relieving internal pain is to apply heat to the surface, keep the body still, and, if possible, excite perspiration, which is expe-dited by anodynes and the use of warm fluids. But in all cases it is of the utmost importance to discover and remove the cause; this the patient can rarely accomplish; and even the ablest physician would in his own case often be puzzled to determine whether pain arose from mere irritation or from inflammation; for pain and self, acting together, are great per-verters of the judgment.

Ten grains of Dover's powder, or thirty drops of tincture of henbane, for an adult, conjoined with warmth to the skin and the free use of unstimulating drink, is rarely inappropriate in any kind of pain, and the warm-bath almost invariably relieves pain. *Sudden pain*, preceded by feebleness of circulation, is gene-rally of a neuralgic kind, and may commonly be relieved by the use of stimulants, but the habit of resorting to them is dangerous, and apt to confirm

such diseases, which are only to be cured by measures directed to the improvement of the general health.

Pain in the head, if the head be hot, is safely relieved by lotions of spirit and water and vinegar, applied copiously, and allowed to evaporate. If the forehead be cool, hot applications usually relieve headache, and if the pulse be low, a stimulant is usually both safe and useful; but all cases of severe headache require perfect quiet and darkness, and if not soon relieved, demand professional aid. The headache of students and sedentary persons is commonly best encountered by a brisk walk on elevated ground, and in general, when this malady does not arise from any morbid growth, it may be cured by regulating the functions, by gentle purgatives, and by taking proper exercise and proper rest.

Pain from increased sensibility, or an inflammatory state of the nerves, is often relieved by increasing nerve action; thus turpentine, or brine, or considerable heat, diminish the pain of a scald, and camphorated spirit and vinegar lessen the itching of chilblains, and tend to cure them.

*Pain with inflammation* is diminished by reducing the force of the pulse, and by quieting the nerves, as by low diet, cool air, sedatives, and increase of excretion. In *gout and rheumatism*, from ten to twenty drops of wine of colchicum seed, with five grains of powdered rhubarb, fifteen of magnesia, and half a drachm of tincture of ginger, with a little mint-water to be taken twice a day, form a common mixture, but no mean remedy; yet to trust to a recipe and

one's own notions, when the aid of practised skill can be obtained, is in any case foolish.

Pain arises from an excessive nerve-action, and is usually accompanied by an increased action of the heart, hence those medicines usually relieve pain which diminish arterial action. Exceptions to this rule are found only where an increase of one local action lessens another by a kind of nervous consent, as when a blister allays an internal inflammation, or an excitement in one function subdues the morbid disturbance of another.

All narcotics probably act at first as stimulants, and for awhile may thus increase pain, but their succeeding effect is usually sedative and tranquillizing. Narcotics exert a marked influence on the blood, mainly it seems, through the nervous system, but perhaps the effect on the nerves may often be secondary. It is certain that opium, for instance, when given in large doses, hinders the conversion of venous into arterial blood, and may thus produce stupefaction of the brain and the suppression of secretion. Whatever retards the action of the oxygen respired on the blood, also diminishes secretion, and deadens sensibility, but the reaction is attended by greater secretion, and increased sensitiveness. Consciousness, or the power of attending to objects through the senses, being dependent on the circulation of duly oxidized blood through the brain, any agent that greatly impedes the action of the air on the blood, or supplies the blood with a check upon life, has a tendency to intoxicate and

stupify. Hence alcohol, æther, chloroform, and such compounds as possess but little oxygen in proportion to their carbon and hydrogen, whether breathed in vapour, or taken into the stomach in full doses, produce mental obliviousness, and thus a man, thoroughly intoxicated, may receive the most violent injuries without at the time being conscious of them.

Chloroform is a most convenient agent for the production of insensibility, since in being breathed in conjunction with a due proportion of atmospheric air, it very speedily causes such a condition of the blood that the mind cannot attend to objects. It is thus made available to prevent the suffering and shock that would otherwise attend surgical operations, and some of the processes of nature. If, therefore, so great a good can be accomplished without consequent evil, such an agency must be regarded as among the greatest blessings conferred by Heaven on humanity. Doubtless, in 999 cases in 1000, chloroform may be administered with safety and success, under the management of a man familiar with physiology and disease. This, however, is no reason why it should always be resorted to in case of pain.

Chloroform is not a harmless agent; it may be so administered as to kill in a few minutes, and notwithstanding the glowing statistics sent out to the public, its fatal effects have often enough been witnessed. Yet the same may be said of any blessing.

Is it right and Christian to use chloroform to prevent the pangs of parturition? Of course it is,

even if the woman's sorrow meant mere physical pain. There is no reason why we should not remove it if we can. We have a right to cure disease, and to avoid all that is accursed, and all the results of sin and evil, as fully as we have a right to avoid sin and evil themselves. The royal law requires us to afford relief to others, just as we would desire it for ourselves.

But, then, is all pain disease? No: pain is sometimes a preservative from disease by indicating the direction of danger. Every part of the body is endowed with a sensibility peculiar to itself, and in keeping with its function; thus, a ligament may be cut or burned without causing pain, but a strain upon it causes intense suffering. Now, if a part liable to excessive action be robbed of its sensibility, the danger may be increased, because there is no warning of the danger afforded by sensation.

For these and other reasons not here to be mentioned, the use of chloroform in ordinary cases is by no means to be recommended. It always requires to be directed by skill,—it damps the fire of life, and may extinguish it; and however useful it may prove when the interference of the operator is demanded, I still contend that, as it operates like partial drowning, or hanging, in producing a kind of suspended animation, it is never to be employed but to avoid a greater risk: of that a wise practitioner can judge, and in his hands it is safe.

Pain, like weakness, is a symptom of disease, not a disease itself, and an anodyne will only relieve, not cure it. The cure of a malady, not strictly local,

is effected by means that modify all the functions of life.

Either congestion, inflammation, or irritation, accompanies every disease, and in many cases they are all present. These states, we have shown, arise from disorder in nutrition, secretion, or excretion, which are indeed so connected with each other, that what affects one process, more or less influences all. Hence it arises that a variety of modes of treatment seemingly contradictory, may be conducted on the same general principles, and with nearly equal success. Thus hydropathy, acting on all the secretions and excretions, by furnishing an abundance of water, which is essential to every function, and especially by exciting the skin and kidneys, relieves many diseases ; and thus, too, purgatives perseveringly given, control a large number of morbid conditions, when these conditions do not arise from insufficient supply of good blood. Thus, also, alteratives, as sarsaparilla, small doses of blue pill, salines, mineral acids, and such things, increase vital action almost imperceptibly, and cure chronic disorders in a chronic manner, provided they are not kept up by mental causes, or the continuance of bad habits. But the habit of taking medicine is itself a bad habit, a disease, in fact, which it is the chief business of honest medical men to prevent or cure. It needs no inspiration to teach us, that exclusive treatment must be unaccommodating to nature, and as likely to beget disease as to cure it ; in short, common sense instructs us, that he is the best physician who best

aids nature with his remedies, and knows equally well how to apply, and when to withdraw them ; as,

“For want of timely care,  
Millions have died of medicable wounds ;”

so also multitudes have perished from over-officiousness, and inability to stop the remedy before it took the place of the disease, and did its work. It should never be forgotten that an appropriate medicine that is well borne in disease becomes a direct poison when the malady is gone.

“Take so much rhubarb,” learned Galen says,  
“Take so much cassia, so much aloes,  
So much of t’other, and of such and such,”  
Give me this recipe—“*Take not too much.*”

## CHAPTER XVII.

### NATURAL MEDICINE, REGIMEN, AND DIET.

“ Says Nature to Physic, what pity that we,  
Who ought to be friends, should so seldom agree ;  
We ought to assist and to succour each other,  
And in amity live, like a sister and brother :  
For Physic should know I am not to be taught  
By severe flagellation to do what I ought ;  
But my faults may be mended by gentle correction,  
To which science and talents must give the direction.”

BACON says,—“ Those that put their bodies to endure in health, may, in most sicknesses, which are not very sharp, be cured only with diet and tendering.” This tendering and diet are usually, however, aided in no trifling degree by medicine.

In the simpler states of society man is very successful in treating the diseases to which he is most exposed, and the more complicated diseases of high civilization are met by a corresponding practice; but yet it is astonishing how similar are the modes of treatment followed by the intelligent in all ages. It is not without significance that the perfection of

science leads us back to the simplicity of nature, and to the use of remedial measures suggested by a sort of instinct, when knowledge was too limited to say why or wherefore. In wounds and severe injuries, for instance, the balsamic and soothing applications, with unstimulating diet, to which thoroughly uncivilized tribes resort, are the very best that exist for the prevention of putrefaction, and to facilitate healing.

The poultice of aromatic herbs applied by the Indian, and the sour wine and the oil which the good Samaritan poured on the bruised wounds of the man that fell among thieves, are just such as Hippocrates would have prescribed, and Liebig approved; for our knowledge of vital chemistry assures us that they are exactly suitable for such cases, especially in a warm climate. Such facts, however, do not teach us to despise science, but prove rather that its principles are truly those of nature. Real theory is founded on facts viewed rationally, and he is the wise physician who practises in consistency with the design evinced in natural agencies, and applies his experience with distinct ideas of means and ends, as marked by true science, which is only an acquaintance with the modes of nature.

Hippocrates, and those of like mind before him, prescribed the best remedies for the vital disturbance, rapid pulse, great heat, and want of appetite, accompanying inflammatory and feverish disorders, much in the same manner that any judicious physician would now do. He diminished the heat-producing action of the air on the blood, in acute

disease, by directly lessening the force of the circulation by bleeding, or, in mild cases, by trusting to means that act more slowly through the excretory organs. He directed the use of such food as would support the respiratory process without enriching the blood, such as subacid fruits and mucilaginous fluids, with the addition of such medicines as contain those alkalies which promote all the excretions. He would give vegetable jelly and pulpy fruits, particularly in coughs and pulmonary complaints, and science shows us that in such cases no treatment is more rational, for vegetable jelly contains an excess of oxygen in relation to the hydrogen, its elements being carbon and water *plus* oxygen, and therefore well suited to maintain the functions in efficient action without exciting the heart, which is exactly what is needed in congestive and inflammatory diseases. Substances of this class also promote the action of the bowels. He would keep the bowels relaxed, the skin comfortable, the kidneys active, the mind quiet, the body at rest. Gentle aperients and a saline draught two or three times a-day, with diluent drinks, such as barley-water with gum and prunes, are now familiarly adopted in such cases with success. By such means, with proper air, cleanliness, temperature, and patience, the balance between waste and supply will usually be restored, and the majority of diseases cured. More potent measures, however, are generally required when the vital disturbance is violent.

As all diseases more or less depend on the functions which determine the proportion between waste and

supply, it follows that the treatment that most decidedly influences the advance or retardation of disorder is that by which the relation between the blood and the air is most affected. The excretions, in great measure, balance each other, and the increased activity of one function generally tends to diminish the power of other functions. Hence, the methods adopted in all acute diseases of immediately counter-acting the disorder by substituting a new action in some other part or function. The skill of the physician is manifested by his choice of means, or by the fitness of the various methods by which he endeavours to excite just that amount and kind of action which shall best diminish general disturbance, and favour the restoration of the functional equipoise. Thus, in fainting, he would help the heart to overcome gravitation and to propel the blood towards the brain, by causing the patient to lie with the head low, and by rousing nerve-action, as by a dash of cold water, or by some other stimulus. A thousand successful modes of treating most acute disorders suggest themselves, as a matter of course, to one who is well acquainted with physiology and the doctrines of disease, as well as of health, but a man of science can work well with few tools. There are too many books of recipes, too many dogmatic methods, too many attempts to rectify nature by patent prescription and formal rules; but true remedies are only aids and accommodations of nature, according to the requirements of each case, just as they arise. We cannot all be doctors, but we may all assist more learned skill, and understand that the more steadily

we keep the machinery of life in action, and the more naturally we set about righting it when wrong, the more likely it is to continue fit for use.

By attending to the waste and supply of the system, and by acting upon what we know of secretion, excretion, and assimilation, we may do much to preserve or to restore health, is shown by multitudes of familiar instances, such as that of Cornaro, who well says, "That if all men would live regularly and frugally, there would be so few sick persons that there would be little occasion for medicines; every one would become his own physician, and would be convinced he never met with a better." Nevertheless, if Cornaro had been foolish enough to follow his own notions instead of his physician's advice, he would never have written that sentence. He, like most others, thought little of regularity and frugality until threatened with death, and told by his doctor how to live. He states, "As soon as I resolved to believe my physician, and thought it a disgrace not to have courage enough to be wiser, I accustomed myself so much to live soberly that I contracted a habit of so doing." There we see the whole secret—the *habit* of living soberly was his grand acquirement, and this he learnt from his doctor. The nourishment he took was just enough to suffice nature and add no burthen; but he took care to avoid all extremes; he abstained from violent exercises, from ill hours, and bad company; but his especial care was always to eat slowly, to rise from his meals with an appetite, to take moderate exercise, and, above all things, to avoid over-stimulation and unwholesome air. We

must not suppose that his abstemiousness was so extreme as is often taught—he took a pint of new wine daily, with at least sixteen ounces of solid food; but his activity was great in proportion to his nourishment. Thus, he lived to be nearly a hundred years old, and when above eighty he wrote his famous little book on health. The state of mind resulting from his temperate habits is well expressed in his own words: “I enjoy perfectly the pleasures of this mortal life, thanks to temperance and to God, and I look upon death as the necessary passage to heaven.” This experience confirms the saying of Addison—“For the most part, physic is nothing else but the substitute of exercise and temperance.”—(*Spectator*, No. 195.)

Chronic diseases are mostly attended by congestion, fulness of the blood-vessels, or by too great excitement of the brain, and consequently by debility, and those disorders of sensation called nervous affections. Such cases may be always relieved, and often cured, by strict regimen, exercise, and temperance. Cornaro’s was such a case. Another instance, equally, if not more to the point, is that of the miller, Thomas Ward, of whom Dr. Baker gives some account in the *Transactions of the College of Physicians*. At the age of forty-five he was near death from a disease of the chest, involving the heart. His sleep was disturbed, his spirits extremely depressed, and at length a most formidable sense of suffocation came on with even the slightest exertion. He was a stout man and a hearty eater, but having Cornaro’s book put into his hands, he

was convinced by its arguments, and at once retrenched his diet, by degrees, until at last he limited himself to a pudding made of biscuit and a pint of milk every day. He gave up all other drink whatever. By this regimen his health was re-established, his spirits became lively, and his strength so improved, that he could carry a quarter of a ton weight; and from a decrepit old man he was restored to the vigour and activity of youth. It should be observed, that his diet was aided by other measures suited to his case—he went to bed at eight every evening, and rose an hour or two after midnight, and sometimes walked for six hours before ten in the morning! The narrative traces his progress for seven years, during which he pursued the same plan with the same advantage. It would of course be madness exactly to follow such an example without exactly the same circumstances, yet the principle may be followed by multitudes of chronic invalids with equally beneficial results. Use well the powers you possess, and they will improve, and remember that the vital powers are more readily destroyed by the burthen of too great a supply of materials to work with than by the work itself. An over-fed man is like a soldier going to the battle with a week's provision on his back, and one who takes no exercise is as unfit for effort as a stall-fed bullock. Whatever advantage may be derived from the discernment and experience of other minds, every man must in some measure be guided by his own judgment; he best knows his own feelings, and while his limbs are capable of exertion his own will

must move them. But many a man, having by some disorder been kept weak for some time, cannot overcome the habit of disease, and the disposition to distrust his own powers, so that his functions cannot rally—he is spell-bound by morbid sensations, he is out of tune with nature, his activities are all ideal, his body is constantly presenting itself objectively to him, he does not look through it but at it, until it becomes his only associate, he thinks of nothing else, and the very means of enjoyment are converted into the means of shutting out all the beauties both of this world and the next from his view. With such a one the peripatetic physician performs a miracle as soon as he inspires him with the hope of finding health, and bids him look for her in wet sheets, early in the morning, and on the summits of the breezy hills three times a-day, until, by his good-will and activity, he invites her to his bosom, and at length discovers that the rosy goddess is really running about with him everywhere, and laughing in his face whenever he moves.

*The diet of the sick* is probably of more importance than their medicine, at least in chronic disease, but long lists, showing the relative digestibility of different substances, are of very little value, since what would be readily digested by one stomach would be insoluble in another ; and even in the same person the power of digestion will vary according to the condition of the assimilative functions, and the state of the blood. Yet, on the whole, from the multitude of experiments now before us, and, indeed, from the known laws of digestion as a chemical process, we

conclude that it must proceed with rapidity, according to the quantity of food in the stomach, the closeness of its texture, its simple solubility, and the amount of gastric fluid secreted. The more nearly the food approaches to the nature of the blood, the more readily it is digested, provided it is minutely divided; thus a solution of flesh, as in a decoction of beef, seems to be received at once into the blood as direct nourishment to the system. But we must distinguish between digestion and solution: many substances are easily dissolved that are not the least the nearer to blood on that account. That is best for the stomach that may be easily reduced to a soft pulp, furnish the materials of healthy chyle, and still leave something in the bowels neither nutritious nor offensive.

The forms of indigestion are numerous, but they may be conveniently classed under two divisions, indigestion from want of tone, and indigestion from irritation. It is evident that, to employ the same diet in these opposite states, would be contrary to all the laws of physiology.

*Dyspepsia, from want of tone*, in its chronic form, is distinguished by diminished appetite and activity, both of mind and body, sluggishness in all the movements, inability to keep up the attention, a sense of fatigue after slight exertion, sometimes attended by nerve-ache, and generally by a fulness and uneasiness in the head, with a tendency to drowsiness after meals, and a sensation of weight and distension at the stomach; the feeling of flatulence being greatest when the stomach is empty. The face is generally pallid, but sometimes flushed,

and commonly rather bloated. The tongue is coated, but the quantity of saliva is seldom deficient, or very viscid, although a sense of thirst is a frequent symptom. The bowels are sometimes confined, at others relaxed. In this form of disease, tonics and aperients combined are very serviceable, but the greatest benefit arises from due attention to diet. This should consist chiefly of animal food, and good stale bread. It is always safer to take too little than too much, and the danger of overloading the weak stomach will be best avoided by shunning cordials and carefully abstaining from all unnecessary fluid. Coffee is better than tea in such a case, but it should not be strong, and it is better at breakfast to take a small quantity of the lean of roast meat with the bread than either butter or egg. The dinner may consist of any juicy and tender animal food, without fat, and with a due proportion of vegetable substance, such as mealy potato, boiled rice, turnip, asparagus, cauliflower, or French beans. Wine and water, cold, may generally be taken with advantage in small quantity, either during or immediately after dinner, good port-wine being commonly preferable to sherry in this case. Shun sweet and oily substances, jellies, and all fruits. Eat slowly, and retire early and supperless to an airy bed. If by this kind of dieting the symptoms of atonic indigestion are not relieved, some misemployment of the body, or some anxiety, or other bad habit of mind, is probably the exciting cause of the disease, and this must be amended before diet will effect much benefit.

*In dyspepsia from irritation, there is a rather dry*

furred tongue, with constipation, the urine being sometimes very scanty and high-coloured, at other times very copious and clear; the skin is usually harsh and dry, and there is a tendency to eruptions of an irritable kind. The temper becomes peevish, and the spirits oppressed, and, in its most aggravated form, this disorder is accompanied by all the miseries of hypochondriasis, with a feeling of universal coldness, inaptitude, and restlessness. This state of things is often attended by a great amount of irritation in the stomach, which at first must be remedied by the strictest abstinence, and the most soothing and bland diet, indeed, very nearly such as would be suitable in inflammation and fever, such as arrow-root, sago, rice, gruel, and slightly acidulated saccharine drinks, allowing no solid food until the stomach is relieved from its tenderness, and the appetite, tone of mind, and state of the excretions, indicate a healthier state of the nerves, when a freer diet may be indulged in, always remembering, however, that the farinaceous substances are most digestible in this form of disease. The milk-and-seed diet recommended by Dr. Cheyne and others was most successful in preventing the recurrence of this form of disease, when it had been cured by abstinence, rest, and warm bathing.

There are slighter forms of this disease, which may be considered rather as occasional irritability of the stomach than as a permanent malady, and with this every variety of nerve-disorder may occasionally be observed, so as to present almost as protean a character as hysteria itself; for we have

not only unnatural sensations in the stomach after eating, with a variable state of the bowels, and a restless brain, but we have all sorts of wandering pains, constantly calling up a morbid attention, and producing almost every class of symptoms for which the physician may inquire. In this disease medicine generally does harm, and any diet, if strictly temperate and regular, will be equally advantageous, provided the mind and body be kept agreeably and naturally engaged, and free alike from over excitement and fatigue. The disappointments of romantic hope, and the feverish anxieties of excited passion, frequently induce this disorder; and it is the chief support of the advertising quack, who treats it with direct tonics and cordials, or with false ideas, that fix it as a life-long malady upon the shattered nerves of his victim.

*Biliousness*, as it is called, is a common symptom of indigestion, and arises from congestion in the liver alternating with over-action. It is best avoided by a highly animal and dry diet, without fat, provided a good amount of exercise can be taken. This sort of diet tends to regulate the bowels far better than any other, but it is necessary to insure the freest exercise, and to shun stimulants. In bilious habits, fat, sweets, and slops, are most injurious, but it is the mixture of these that does most mischief. The fat and the sugar are prejudicial rather from their being taken with an excess of fluid, and a deficiency of exercise, than from anything prejudicial to the constitution in themselves. Fat may be freely taken without disordering the liver by excessively

exciting it to dispose of the overplus of carbon, provided that very little drink be taken, for the slow combustion carried on in the body is sufficient, when the lungs act well, to produce water enough for the use of the system by the union of the hydrogen of the fat with the oxygen breathed. Hence it is that the fat-eating tribes of the frozen regions thrive so well almost without drinking anything but train-oil. Biliary persons should avoid much fluid, especially in changeable weather.

*Gout* is a disorder accompanied and preceded by a peculiar form of indigestion, the tendency to which has been often prevented by strict attention to diet, and this even when the disease was hereditary. A peculiar repletion of the system results from gouty dyspepsy, which favours congestion of the kidneys, and causes the formation and accumulation of *lithic* or *uric acid* in the blood, which is shown by the deposit of *lithate of soda* in the so-called chalk-stones, and in the reddish sediment seen in the urine when gout is beginning to subside. The direct method of preventing this *lithic acid diathesis* is to observe the strictest abstinence from all fermented liquors, and to take no more food of any kind than will just suffice to keep the body capable of full exercise. The animal food should be reduced to four ounces a-day, and the bread should contain a little rye. Pastry and fruit should be shunned. If exercise can be regularly taken, there will be no reason to fear gout as long as the meals are thoroughly temperate, but a day's indolence, or a fit of indulgence will, in a body predisposed, suddenly undo the benefit of many months'

caution ; and it is evident that anything that diminishes the general excretions, will have nearly the same effect as an excess of food ; therefore, whatever is best calculated to steady the action of the bowels, cause full expansion of the lungs, promote the action of the liver, skin, and kidneys, will best prevent gout, and these are moderate meals, cheerfulness, baths, frictions of the skin, and free exercise.

*Constipation* may often be treated with success on dietetic principles. Two extremes are to be avoided in this case, the one too refined a food, the other too coarse ; too refined a food furnishes little or nothing that excites the large intestines to action by the presence of excrementitious substances, and too coarse a food may contain so much of an indigestible quality, and be of such a nature as to become compact in the bowels, and thus obstruct their action. Thus, nuts of various kinds have been known, when taken in large quantities, to produce even fatal obstruction. A due mixture of vegetable and animal substance, and a slight addition of bran-bread, will obviate the difficulty commonly experienced. The starchy preparations, such as arrow-root, tapioca, rice, and sago, are apt to cause constipation, especially when taken with milk, but a large quantity of salt will usually prevent this. Toasted bacon often promotes relief, and there is scarcely a better medicine for the use of strumous children, and persons subject to glandular enlargements, and that general sluggishness attendant on disorders of the absorbent system. The salt hard fibre of bacon is, however, an indigestible substance to an invalid stomach.

Animal food favours the action of the bowels far better than bread; but vegetables are apt to excite irritable action, by passing into the small intestines too quickly, and in undigested masses. Too much fluid begets a habit of over-action in the skin and kidneys, hence the water-cure is commonly attended by constipation. Priesnitz obviated this, by allowing an immense supply of greasy diet, sour cabbage, and wild strawberries; but English stomachs will not tolerate such treatment in this damp climate, so our home hydropathists are wofully perplexed, and often obliged to give aperients. The German, however, is right; for if the stomach receive more carbonaceous and other matter than the absorbents of the bowels can readily take up, and more than the liver and lungs demand, this matter will prove excrementitious, and provoke the peristaltic action, especially when assisted by plentiful exercise, and the tonic of cold within and without. Vegetable jelly, already mentioned in this chapter, ought to be more freely used among us than it is; it would generally be far more serviceable than butter as an adjunct to our bread, and it contains *pectine* and *peptic acid*, which are very wholesome, and peculiarly calculated to prevent constipation.

*Diarrhœa*, or relaxation of the bowels, requires a peculiar diet, and may generally be cured by careful attention to the choice of food whenever it arises from mere irritation of the inner membrane of the bowels; and, even when dependent on congestion, there can scarcely be a more direct method of influencing the disordered action than by modifying the

*ingesta*, and accommodating the supply to the condition of the organs involved. Diarrhœa may be either acute or chronic. In the acute form some morbid secretion or other matter irritating the mucous lining of the bowels, is the common cause, and, as the object to be first accomplished is to remove this cause, such fluid and aliments as may facilitate the action, and at the same time soothe the diseased organ, should be employed. For this purpose, nothing is better than barley-water, or arrow-root without milk. At first, nothing solid should be taken, but, after a day or two, when the irritation is quite subdued, a little chicken-broth with a little toasted bread dissolved in it, may be allowed; and after the expiration of three or four days, if there be no return of the earlier symptoms, a small quantity of animal food, with boiled rice instead of common vegetables, may be taken with advantage.

When the bowels get the habit of acting too frequently, and the motions are liquid, it may reasonably be suspected that congestion and indigestion contribute to the disorder, and therefore it should at first be treated much in the same manner that was advised for dyspepsia from irritation—by a very mild diet, and by carefully restricting the quantity of food to suit the diminished power of the stomach. In several instances, I have witnessed an obstinate form of diarrhœa in persons long addicted to drink large quantities of beer, but who being convinced of the evil of their habits, have suddenly and determinately adopted the opposite extreme, and refused even to take a glass of wine, though medicinally

recommended. In such cases, two or three tablespoonfuls of a bitter infusion, such as that of cascara, taken immediately after each meal, will often prove very efficacious, provided the diet be at the same time of a nutritious kind, but small in quantity, and unirritating. Mutton, without fat, is better in such a case than beef and young meat; but the chief nourishment should be derived from good bread, biscuit, rice, and new-laid eggs. Similar management is advisable on convalescence from any of the severer forms of diarrhœa. But it should be especially remembered, that acute symptoms and pain require to be met by simple drinks, or by entire abstinence and rest, it being an approved axiom that wherever there is inflammation or fever, the more perfect the abstinence from solid food, and the more complete the rest, the less the occasion for medicinal aid. But abstinence itself will be followed by a feverish reaction, if the demands of the system be not cautiously considered, and a proper supply of unstimulating food furnished on the restoration of appetite and the tone of the stomach.

*Excessive corpulence* or *obesity* is a disease that arises either from venous congestion and obstruction, or from the digestive powers being great and indulged beyond the requirements of the body. In either case, the inconvenience is to be encountered by a most vigorous command of the appetite, and a degree of abstinence scarcely to be expected but in one thoroughly convinced of the advantages of an active body, and the dangers attendant on a system overladen with its own productions. A stout person can bear a total and sudden lowering of diet far

better than one in an opposite state, and it is quite safe to reduce the diet at once to the required point, provided there is no structural disease of the heart. This, however, is a rare case, and the heart-disorders of persons suffering from obesity are usually remedied by the abstinence that reduces the quantity of blood, and gives tone to the vessels. Half-a-pint of black tea, with five ounces of brown or rye bread without butter, will form a sufficient breakfast. There should be no lunch, but dinner should be taken as early as two o'clock, to allow of exercise both before and after it. Three or four ounces of meat without fat, or one egg, and a proportionate quantity of turnip, or some soft, green vegetable, succeeded by two or three ounces of bran bread, with a little fruit-jelly, and followed by an orange, should suffice for dinner. A glass of wine may be taken once a-day. The mind and limbs should be kept busy until tea, which should resemble the breakfast, be taken early, and be followed by as long a walk as the strength will fairly allow. Thirst should be resisted as much as possible, and if very great, it should be subdued by subacid fruits, or by sipping water flavoured with raspberry vinegar. With this mode of dieting many persons have wonderfully reduced an unwieldy body, with vast improvement to their health, strength, and spirits.

“Extremes have each their vice; it much avails  
Ever with gentle tide to ebb and flow  
From this to that—a meagre day subdues  
The cruder clods by sloth and luxury  
Collected; and unloads the wheels of life.”

ARMSTRONG.

## CHAPTER XVIII.

### COLD AND HEAT—BATHING.

“ IN proportion as an enlarged, comprehensive, and really scientific method takes the place of the narrow, exclusive, and empirical medicinal method, so will the employment of such general agents as air, exercise, friction, water, &c. attain an increasing estimation in the minds of the medical profession. The admirable virtues of cold water, when systematically applied, have been already sufficiently proved, even in the rude and ignorant attempts of the unscientific men who, for the most part, have hitherto prescribed it; and I am disposed to believe that a somewhat similar development of the powers of hot water only waits for the advent of some daring innovator like the inventor of hydropathy. And when the time arrives for the legitimate members of the medical profession to take both methods out of the grasp of their primitive, energetic, but unscientific professors, and apply them, without charlatanry or empiricism, on philosophical principles, we shall then

find that practical medicine has therein made a most important and substantial advance.”\*

If the shrewd and excellent physician who penned the above paragraph had ended it with the word retreat, instead of advance, he would have been equally correct, for, in fact, it is but falling back upon the practices not only of the fathers of physic, but also the more primitive methods of barbarians and savages, to employ air, exercise, friction, and water, as the general means of curing disease. Nothing, indeed, can be more adverse to the successful progress of the healing art than the tendency among its professors to disparage the ruder means, so commonly indicated by nature, in consequence of their attachment to those more convenient medicaments which generally so well answer their purposes. Success often misleads. A man who has treated fever successfully a hundred times with calomel, salines, and quina, is very likely to trust to them in such forms of the disease as would be better managed with the vapour-bath or cold water. Dr. Daniell, in his work on *Tropical Hygiène*, has these important remarks (p. 119): “European practitioners conversant with the medical customs of the negroes of intertropical Africa, cannot fail to be deeply impressed with the marked attention paid by the native doctors to the due action of the cutaneous tissues, and their encouragement to this as a means of relieving disease. The inhabitants of most of the maritime localities in the Bights (on the coast of Guinea) are fully acquainted with these views, and treat the remittent

\* See *A Physician's Holiday*, page 310.

and other fevers to which they are subject, by endeavouring to excite a long-continued and copious exudation of sweat, by the aid of heated sand-baths, ablutions of hot water, and rude attempts to imitate vapour-baths. After a careful observation of the good effects of this system, I was led to pay more particular study to its application, and at length to try a modified adaptation of it for the cure of those remittent fevers so destructive to European life. I have no hesitation in asserting, that not only myself, but many others who have experienced its efficacy by speedy restoration to health, can vouch for its superiority over the ordinary practice." That the nerves of the skin and its excretions are especially affected in remittent and intermittent fevers, is proved by the alternate chill and heat which mark its stages; and as the natural termination of an ague fit is promoted by profuse perspiration, so it seems but reasonable to assist nature in her efforts, accordingly. Even the most philosophical are so far empirical as to learn from experience, and the experience of a savage is as good, as far as it goes, as that of a sage, in respect to the cure of disease. The difference in the cases is, however, still a vast one. The wise man perceives what are the conditions that give rise to success, and considers how he may best insure their operation in any particular case; while the savage goes on in the same course, and attributes his failures not to his ignorance, but the whims of his idols. Dr. Daniell would be far more successful in using the bath than would the savage.

The secret of proper treatment must always

depend, as already shown, upon the nature of the functions disturbed, and the degree in which they suffer. Although it is certain that the skin, the kidneys, the lungs, and the liver will, in a great degree, mutually assist each other in those offices which properly belong to each, yet it is evident that the more naturally the relief is obtained, the less will be the expense to the vital powers, and the more speedy and complete will be the recovery. Each function must do its own duty, or there is no health. Nature, indeed, often sets up a diarrhœa, or a diuresis, for the cure of a disease arising from checked perspiration, yet, nevertheless, the end to be ultimately attained is the restoration of the proper action of the skin. We may give purgatives, deobstruents, diuretics, and other evacuants, and to a certain extent do good, whenever the system is suffering from any kind of suppression, but by continuing these measures in case of extreme debility, or irrespective of any attempt to rectify the failing function is only to confirm the malady, or hasten death. The wise physician will follow the indications of nature without presuming upon his insight; he will always remember that the functions balance each other, and that action and reaction in regular succession, in periods varying according to the amount of power, and the causes in operation, characterize all the processes of life. There is nothing more dangerous than busy meddling, either by attempting too much, or by interfering at the wrong time, or in a wrong manner. All diseases are best managed gently, even the most violent may be coaxed

when they cannot otherwise be controlled; and, according to the old saying, we may easily *guide* a runaway horse, though we might break the bridle in vain attempts to *stop* him.

From too great a confidence in their power to extinguish disease, the semi-scientific of former ages have too frequently failed, where with caution and patience they would have succeeded. Help nature, husband her resources, give her time to rally from any shock she may have received, and remove disturbance, should be our rules. From want of attention to these maxims, the mildest epidemic may become deadly, and the most direful ten times more destructive. Thus in the sweating sickness of 1485 patients were seized with a shivering fit, followed by intense headache, delirium, and fever, which invariably killed them in a few hours if they tried to check the malady with their common sudorific medicines; but those who quietly went to bed on the instant, and carefully avoided anything the least tending to produce chill, and took frequently a little warm drink, passed through the terrible malady within twenty-four hours, with no other consequence than a profuse perspiration and the weakness that followed. Thus, too, the influenza has always been best treated by immediately protecting the body from changes of temperature, and freely employing diluent and warm drinks. The cholera and the plague have often been cured on this plan, if met at the first symptoms; and even where violent disease is more advanced, whatever benefits may result from medicines, they must be aided by those

natural appliances which favour the restoration of the suppressed functions; and of these appliances the most favourable, in most cases, is a warm atmosphere, perfect quiet, rest of nerve, and a free supply of simple fluid, water being usually best, because it facilitates most of the functions, without opposing any, and is the only one that needs no modification to be admitted into the blood. Care should be taken to avoid any sudden reaction, by avoiding excess of any kind; and we must remember that is excess in one condition which would produce no effect in another. Thus, a few spoonfuls of wine or soup will excite a fever in a famished man, and an approach to the fire will cause a frozen part to putrify as fast as it thaws, whereas by gradual change, as by rubbing it with snow, it would be recovered without injury; and thus by cold water copiously, yet cautiously administered, many patients were restored from the collapse of cholera, and that without the extreme consecutive fever which would have resulted had the patients survived from a more stimulating treatment.

*Festina lente*—haste, the proverb says, makes waste. This maxim is especially applicable to the medical art, and worthy of attention among the slapdash philanthropists of our day.

The effects of cold and heat recal to my mind the words that I heard in my youth from the lips of Abernethy—“Cold is bracing, heat relaxing—that is the notion, but only consider its absurdity. Heat excites, how then can it relax? There is a difference between heat and moisture and mere heat. They

say a cold bath is bracing. Ah! a man jumps into a cold bath, and he feels chilled; he jumps out again, and rubs himself with a coarse cloth; he is invigorated, refreshed, and cheery; he feels as if he could jump over the moon. So, if a man takes a glass of brandy, he feels vigorous enough for a little while, but the brandy is anything but bracing. Keep the man in the cold water, and see what a poor shivering mortal he would be; you might almost knock him down with a feather; and add more brandy to the man, and he becomes a lump." Heat and cold, in fact, both operate in the same manner, by exciting the vital powers into action, but to use either to excess as surely debilitates, disorders, and overpowers the system as an abuse of brandy would do. All things that cause action of course must act as stimuli, and whatever rouses the heart and nerves must be proportioned to the degree of power existing in the patient, or it cannot be safe; it is spurring the jaded horse that kills him. Moderation is the course prescribed in the law of nature and of God, and it needs no exquisite discernment to distinguish right from wrong in a general way, or to see when the system needs rest, and when rousing.

*Sea-bathing* is serviceable only as a stimulus to all the functions by rousing the nerves, and hence the heart and arteries, to greater activity. In this manner, I have seen vast benefit in a multitude of cases, more particularly those in which the lymphatic system and the glands were diseased, as in scrofula, tumid abdomen, and harsh skin, with deficient appetite, and indisposition to take exercise. It does

mischief if it does not at once improve power. In such cases, however, great care is required to avoid too long a chill, which always aggravates the glandular congestion. Salt stimulates the skin, but a certain degree of cold and, perhaps, of shock, is necessary for the beneficial effects, a warm bath very often increasing the malady. I speak from my experience of the effects of sea-bathing, and would strongly urge the propriety of preparing children for plunging in the sea, by getting them accustomed to cold sponging at home, as this plan will often supersede the need of visiting the sea for their benefit, and enable them to bear the sea the better when advisable.

Sea-air and sea-water exert a very decided influence upon children, and indeed, upon all who are not accustomed to it, whether in health or disease. Young persons coming from inland situations are very apt to become somewhat fevered by the change, and bilious disorder is a common consequence of their approaching the sea; and in almost all persons sea-bathing begets after a while a slight intermittent disorder, which seldom goes quite off in less than a fortnight from the last bath. If the bath be resorted to daily, this disorder usually comes on in about a week; if only twice or thrice a week, it may not appear for a month, and those who bathe only now and then, without regularity, do not seem to be subject to it. I am disposed to think that this new action of the system promotes the cure of glandular disease, but it may, if neglected, conduce to internal disorder of a worse kind, and I have frequently seen a dangerous

remittent fever supervene upon it in delicate and excitable children. These results prove the stimulating operation of sea-water, and sufficiently show the necessity of caution in its use. Instead of improving the powers of the body, it may produce debility by over-exciting them; hence it is prudent in most cases not to bathe oftener than every other day, and to use milder measures if, after the second or third occasion, there is not a visible increase of vigour. Where exercise cannot be taken immediately after the bath, friction of the body, especially over the back and stomach, is desirable. The best time for cold bathing, where there is any debility, is about two hours after breakfast. Early bathing is best for the robust. Let it be remembered that cold acts always as a stimulant; whenever it does good, it rouses the nervous system; it makes a greater demand for oxygen; it enables the body to absorb more of the vital air, and thus it facilitates the changes on which the energy of life depends. In this respect it acts like all other stimulants proper to the body, and not like alcoholic stimuli, which excite the brain, while they diminish the influence of the vital air upon the blood, and favour capillary obstructions and inflammations.

The influence of cold on the nervous system is no new discovery, for ever since man has felt and inferred from his feeling, he must have known that influence alike from experience and observation. Used as a bath, we have seen that it may produce very contrary effects; like any other powerful agent, it both excites and depresses. The first action of nearly all reme-

dies is to excite; from fire to frost, from aqua fortis to aqua fontis, the influence is always more or less stimulating, and it is capable of depressing the vital powers in proportion to its power of exciting them. Thus the hydropathists have in their hands the power of producing all the stages of the most vehement fever, from the rigor of the severest cold fit to the fiercest excitement which the heart and brain will bear, succeeded by a perspiration proportionately violent; and hence sometimes inadvertently they lose a patient by the production of a sudden sinking like the collapse of cholera. Some tact and skill, therefore, are requisite for the safe employment of such an agency as cold water.

Paracelsus treated that form of St. Vitus' Dance which prevailed in his day, and which he called *chorea lasciva*, by cooling his patients in tubs of cold water; and Priesnitz brings his patients also to the right point by baths that allow no idleness to whatever function of nature may remain capable of action within them, and thus he often removes partial complaints by a general diversion. Aubrey, in his account of the great Harvey, informs us of a bold piece of practice with cold water. He says, that when Harvey had a fit of the gout that interfered with his studies, "He would sitt with his legges bare, though it were frosty, on the leads of Cockaine-house, put them into a payle of water till he was almost dead with cold, and betake himself to his stove, and so 'twas gone." Harvey doubtless knew how to balance matters in his own mind between the risk and the remedy, and he might feel justified

in treating himself with less gentleness than his patients ; but perhaps physicians should try such extreme remedies only on themselves. Since Harvey's day, the virtues of cold water in fever and inflammation have been abundantly tested, and we find it is capable of producing contrary effects, according to the condition of the body at the time. Thus, if it be long applied, or applied when the vital action is low, it dangerously depresses the vascular system, to be followed by a more or less dangerous and obstinate reaction ; but if the system be tolerably strong, without being very excitable, the use of cold in a moderate degree always safely increases vigour. It is therefore always safe so far to employ cold, as will help to maintain the ordinary temperature of the body. Thus, in fever, when the skin is hot, sponging it with cold water is both most refreshing and curative ; while a free use of cold water as drink is almost always in such cases highly advantageous.

It has been well shown by Dr. R. B. Todd in his Lumleian Lectures at the College of Physicians, on what principle cold may be employed to modify and control a great number of diseases, especially those of a convulsive character. But these things are of course known, or ought to be known, by professional men ; and as they are not of a character to admit of practical application, except by those accustomed to treat disease, it will answer no good purpose to enlarge on the subject in this place.

The *warm-bath* is among the most useful of remedial measures. One who has experienced the

delicious refreshment of a warm-bath at about the temperature of the blood (100°), after exhausting fatigue and want of sleep, whether from disease or exertion, will need no arguments in its favour. It is exactly under such conditions that it is most useful. From time immemorial, thermal springs of tepid warmth have been lauded for their virtues in relieving nervous disorders, and diseases dependent on insufficiency of blood, and exhaustion of the brain, such as the dyspepsy of anxious persons, and individuals debilitated by excitement, bad habits, and hot climates. The mode in which it acts seems evident,—it checks waste of warmth from the skin, invigorates its vessels without producing perspiration, admits a little pure water into the blood by absorption, and by its tranquillizing influence on the nerves, favours the action of any function that may have been checked or disturbed. The body becomes highly electric in warm water, and probably all the conditions of increased power are present for the time at least; and, of course, so far as warm bathing promotes appetite, digestion, assimilation, and sound sleep, it contributes to the establishment of increased vigour. Thus we find, that hypochondriacal patients have often found new hopes in the genial lymph as it embraced and laved their naked limbs; they have felt the elements were still in their favour; they have rejoiced in the sunny air, and taken their homely meals as if they were ambrosia, with hearts grateful to the Hand that helped them. The blessing may, however, be abused,—the remedy may be made a luxury, the means of health a cause of weakness.

When continually resorted to by persons well nourished, but inactive, it is apt to produce a flaccidity of the system, and to encourage that relaxation of the veins which predisposes to excessive formation of fat. For the same reason, it is generally injurious where there is a tendency to dropsy, and in some such cases I have known it immediately followed by great lymphatic effusion in the cellular tissue, which has been quickly removed, however, by saline aperients and tonics.

In all climates, warm springs are resorted to for the cure of cutaneous, neuralgic, and rheumatic diseases. As a specimen of the wonders performed by them, we may quote what Dr. James Johnson says of the waters of Pfeffers:—"Lepers are here purified—the lame commit their crutches to the flames—the tumid throat and serofulous neck are reduced to symmetrical dimensions—and sleep revisits the victims of rheumatic pains and neuralgic tortures."\* In these baths, patients are accustomed to lie six, eight, ten, and sometimes sixteen hours a day. A German writer informs us, that the country people stay in these baths from Saturday night till Monday morning. With this degree of maceration, the effects are not surprising, and it is only wonderful that the English who have visited them have not learnt how to estimate their own thermal springs at home. Let the waters of Bath be used with proper confidence and decision, and they will again be found as efficacious as they were a hundred years ago. There is everything in the nature of these

\* Economy of Health, p. 169.

waters to supersede most of the warm baths of Germany, simply as baths, and their temperature at their source is such, that they can be applied either as hot, warm, or tepid, being 116° as they gush up in the centre of the King's bath, while those of the wonder-working Pfeffer's are only 100°, and contain nothing that tells medicinally with any force upon the system.

As it is the combination of heat and moisture that renders the thermal bath so efficacious, it frequently happens that a thoroughly hot bath most effectually facilitates the cure, and we are not astonished that the parboiling waters of Emmaus, at 148°, on the shores of Tiberias, are as famous for their cures as any of the German baths. The semi-barbarians about the sea of Galilee, the inhabitants of Iceland, and the savages of America, know how to employ the hot bath skilfully; and if we were equally accustomed with them to exercise our natural instinct and common sense, we also might bathe in hot water without consulting the doctor; but as it is, we had better take advantage of a better opinion than our own. I the more earnestly urge this course, because I know the danger of all hot baths, wherever there is acute disease of an inflammatory kind affecting internal organs, more especially of the lungs, heart, and bowels. Even *acute* rheumatism is more likely to attack the heart when the hot bath is employed; and where there is any considerable structural disorder of that organ, the use of the bath in any form is at all times attended with risk.

Warm baths are useful in all nervous disorders attended with debility, in all cases in which there is dryness of the skin and a tendency to feverishness, in mental fidgetiness, in irregular circulation, as when a person cannot take due exercise and is subject to coldness of the feet or hands, and in many forms of congestion and dyspepsia, with tenderness over the stomach. It is serviceable in the convulsive diseases of children, and in painful diseases, especially of a spasmodic kind, but more particularly in cases of chronic irritation from local causes, whether of the skin or of internal parts. It is injurious to plethoric persons, to persons subject to hæmorrhage of any kind, and in the active stage of fever. But whether it would be good or bad in any individual case, can be determined only by one who has ability to examine and judge of that case.

As a general rule, mineral and salt-water warm baths are less relaxing than those of pure water. The vapour bath, when the vapour is not breathed, acts more powerfully, though much in the same manner as the warm bath, but it is more useful in common cold and rheumatism. The warm-air bath, at from 100° to 120°, is highly convenient and useful, where it is desirable to excite perspiration, as in rheumatism, scaly eruptions, and certain stages of fever and cholera. The plan most readily adopted is that of Dr. Gower:—A lamp is placed under the end of a metallic tube, which is introduced under the bed-clothes, which are raised from the body by a wicker frame-work, and the degree of heat regulated by moving the lamp.

The *cold bath* is unsafe in infancy and old age, in plethoric habits, in spitting of blood, in eruptive diseases, in great debility, during pregnancy, and in case of weakness from any existing local disease of an acute nature; but in nearly all other states of the body, cold water is the best stimulant of the nerves, the finest quickener of every function, the most delightful invigorator of the whole frame, qualifying both brain and muscles for their utmost activity, and clearing alike the features and the fancy from clouds and gloom.

Cold may always be safely applied when the surface is heated by warmth from without, as from hot water or the vapour bath, and, indeed, whenever the body is hot without previous exercise of an exhausting kind. Probably, the method adopted by the Romans, in their palmiest days, of plunging into the *baptisterium*, or cold bath, immediately after the vapour or hot bath, or, as a substitute, the pouring of cold water over the head, was well calculated to invigorate the system, and give a high enjoyment of existence. The Russian practice of plunging into a cold stream, or rolling in the snow, after the vapour-bath, is said to be favourable to longevity. The Finlanders are accustomed to leave their bathing-houses, heated to 167°, and to pass into the open air without any covering whatever, even when the thermometer indicates a temperature 24° below Zero, and that without any ill effect, but, on the contrary, it is said that by this habit they are quite exempted from rheumatism. Would that the luxury of bathing, so cheaply enjoyed by all classes of old Rome, were

equally available among ourselves. The conquerors of the world introduced their baths wherever they established their power; but we have repudiated the blessings of water in such a form, and now the Russian boor and the Finnish peasant, the Turk, the Egyptian, the basest of people, and the barbarians of Africa, shame even the inhabitants of England's metropolis; for everywhere but in our land, though the duty of cleanliness may not be enjoined as next to godliness, as with us, yet the benefit and the luxury of the bath are freely enjoyed, as the natural means of ablution and of health.

“With us, the man of no complaint demands  
The warm ablution, just enough to clear  
The sluices of the skin, enough to keep  
The body sacred from indecent soil.  
Still to be pure, even did it not conduce  
(As much it does) to health, were greatly worth  
Your daily pains.”—ARMSTRONG.

## CHAPTER XIX.

### MINERAL WATERS AND THEIR VIRTUES.

“*Scire potestates lymphorum, usumque bibendi.*”

“Thus drinke, thus lave, nor evermore lament,  
Our sprynges but flow pale anguishe to befriende.”

HARRINGTON.

It would answer little useful purpose to enter fully into the consideration of all the virtues ascribed to mineral waters, but we may derive much instruction even from a glance at the testimony given concerning the waters of our own country, from those who have enjoyed the opportunity of rightly judging of their effects. By considering the information thus obtained in connexion with the views propounded in this volume, and by comparing the united evidence, we may arrive at practical conclusions of no small value.

*Bath* affords the only hot mineral water in this kingdom. The water at its source being 117°, is capable of accomplishing all that moderately hot water can when fairly employed as a bath. It is

also drank. What are its virtues? Dr. Falconer, an able physician, says, "It is most beneficial in those sequelæ of gout which are attended with debility of the *digestive organs*." Dr. Saunders, the author of a highly practical work on mineral waters, states that, "In gout the greatest benefit is derived in those cases where the gout produces anomalous affections of the head, stomach, and bowels." Dr. Spry, a keen observer, says, "That in gouty enlargement of the joints, three forms of using these waters are necessary—drinking, bathing, and pumping. The first, with a view of strengthening the stomach and organs of digestion, which are usually very much impaired; the second, to promote a determination to the skin; and the third, as a local application to the tumefied joints." Dr. Summers states, "That of 310 paralytic patients admitted into the Bath hospital, 208 were either cured or received benefit." About thirty of these patients were more than forty years of age, fifteen were above fifty, and five were upwards of sixty. When it is added that most of the patients were sent as incurables from other hospitals, it must be admitted, as Dr. Summers observes, that the statement is strongly in favour of warm bathing in such cases.

Dr. T. Thomson well remarks, "that it is difficult to see how Bath-water can be applicable to such a variety of diseases;" and we are ready to believe, with Dr. Falconer, "that melancholy experience places it in its true station, by teaching us that it is possible, by florid description and amplification of success, to mislead almost as effectually as by advancing a posi-

tive falsehood." These observations apply to more waters than those of Bath, and yet what Dr. Falconer says in another place, helps to diminish our astonishment, since a remedy so valuable in dyspeptic disorder cannot fail to evince its virtues in a multitude of associated maladies. "Every medical practitioner at this place," says the Doctor, "has seen instances of people labouring under want of appetite, pain and spasm of the stomach and bowels, together with all the symptoms of depraved digestion, joined to a very great degree of weakness both of the body and the spirits, relieved by the use of the Bath waters. A few days will frequently work such a change in the situation of the patient as would be scarcely credible, were it of a less common occurrence. The appetite is often restored altogether, the natural rest returns, and the spirits are raised to their proper pitch. The strength, likewise, improves daily, and the natural secretions and regularity of the body are restored."

This testimony is much in the style of that from Gräfenberg, and resembles so nearly the reports formerly given by the fashionable practitioners of all fashionable watering-places, that we might believe that the virtues of the waters, whether pure or mineralized, were alone to be lauded for the surpassing cures effected at home and abroad. But we must remember that good air, cheering expectations, new habits, abstinence from quackeries in physic and in food, with abundant exercise where it is possible, and a free action of the skin, bowels, and kidneys, produced by baths and drinks, even when exercise cannot be taken, must accomplish nearly all that

can be done in chronic congestions and their consequences. Neither “Bladud, high theme of Fancy’s gothic lyre,” nor Abernethy, need arise to tell us that, such means being adopted to rectify the functions, the Bath water or any other will be of no small efficacy in chlorosis, visceral obstructions, liver complaints, palsy, gout, rheumatism, gravel, neuralgy, hypochondriasis, St. Vitus’ dance, chronic eruptions, and almost any disease accompanied by bad blood and sluggish circulation. The signs of Bath waters agreeing with the patient apply to all waters. They are likely to succeed when they impart a pleasing glow to the stomach, cause appetite, raise the spirits, and excite the kidneys. “If,” says Dr. Falconer, “the mouth feel moist, pleasant, and cool for some time after taking the water, and the tongue remain of a good colour during their use, we may reasonably presume that they agree with the constitution, and will benefit the health.” Let us see how far what is stated by good authorities concerning other waters agrees with the preceding observations.

*Buxton* is nearest akin to Bath water with respect to its mineral constitution. The supply is copious, clear, and pure, at a temperature of 82°. It is recommended by Dr. Saunders, on the same grounds as he advises the use of common water. We may, therefore, conclude that Bath water was esteemed by him only as hot water, convenient for purifying both the skin and the stomach. Dr. Robertson, a resident practitioner, states that, “The bath at Buxton is immediately followed by a decided glow, increased vigour of body and mind, increase of appetite, and

of general secretion and excretion. This is apt to be followed in the course of a few days—the bath being used every day—by some degree of sluggishness of the organs, and, these indications being unheeded, by feverishness and general derangement." Sir C. Scudamore says that "Some invalids complain of flushing, headache, and slight giddiness after drinking the water. Pure water, taken copiously at the same temperature, and especially if conjoined with bathing, would excite the system sufficiently to account for all the symptoms induced, and benefits accruing from Buxton water." As W. E. Lee observes, "In some forms of *dyspepsia*, arising from too free living, in nervous disorders and other states of deranged health, where the equilibrium between the surface and the internal organs is destroyed, the Buxton baths and the bracing nature of the climate would be likely to render effectual service."

*Clifton hot well*, is nearly pure water, at 74°, and its virtues are intermediate between those of Buxton and Bath. There is one important fact, however, in connexion with all these thermal or warm mineral waters—they contain no free oxygen, but a considerable proportion of nitrogen, with a little carbonic acid. They are quite as little mineralized as ordinary drinking water.

*Malvern waters* are to be valued rather because they are chemically indifferent, and exactly suited for hydropathic purposes. Vetter, a German writer, quoted by Mr. Lee, wisely observes that, "The purer a water is, the greater is its solvent power; it is more easily absorbed, excites the vascular system,

and causes a greater degree of vital action, a higher grade of feverish reaction and *crisis* in the secreting organs." There is no doubt that Malvern water, with the advantage of pure air, noble scenery, and an elevation of thirteen or fourteen hundred feet, will be highly advantageous, during the summer, to invalids suffering from general inactivity of the functions, such as scrofula, dyspepsia, cutaneous eruptions, and gravel, in which complaints Dr. Johnstone, of Worcester, particularly recommends Malvern.

*Harrogate* waters are of three kinds—sulphureous, saline, and chalybeate; and they are of course described as of marvellous efficacy in every disease to which sulphur, salts, and iron, dissolved in water, and applied liberally, within and without, have been useful. The more obstinate the disease, the more welcome the patient to the doctors of Harrogate. Dr. Adam Hunter informs us, in his work on Harrogate waters, that "their virtues are proved in the case of scrofula, scurvy, gout, chronic rheumatism, stone and gravel, hypochondriasis, *confirmed dyspepsia*, with inactive liver and bowels, jaundice, chlorosis, syphilitic sequelæ, and all obstinate skin diseases." He says, "The water speedily carries off the effects of intemperance, in those who resort to Harrogate with their systems loaded with impurities, and whose stomachs are debilitated." He is speaking of the *sulphur water*, and adds, "Its use is acknowledged in those predisposed to apoplexy. In gout, also, in both its principal divisions of regular and irregular, it is equally efficacious: in the first, the constitution is sound and vigorous, and the fits

severe and regular; in the second, the constitution is debilitated, and the fits irregular, the alimentary canal, head, chest, and urinary passages, affected with various complaints, alternating with the fits. In the former, the water may be taken as an habitual laxative; in the latter, the warm or vapour bath in conjunction with it, will frequently prove useful. In the numerous complaints comprehended under the term indigestion, it is useful, but the saline chalybeate is, in many such cases, preferable to the sulphur water."

By the way, it is said that, somewhere in Germany, a spring was discovered; the analysis of which presented ingredients never before known to come from the bowels of the earth, and surpassing, in fragrance and potency, those either of Enghien or of Harrogate; but, alas! a drain in the neighbourhood being mended, the source of all these balmy virtues was suddenly sealed, and the well sank to Zero in the public estimation, for it contained nothing but pure water. That the salubrity of water should be estimated by such wise people as the Germans in proportion to its impurity, must be very consoling to those Londoners whose wells and cesspools are found under the same roof.

*Dimsdale* water is saline and sulphureous, and commended by Mr. Walker, a resident practitioner, in *dyspepsia* and *hypochondriasis*, as a remedy of decided efficacy. It is said to have a specific effect on the liver, "rapidly subduing chronic inflammation, and producing healthy action, without causing debility. That it should be in high repute in chronic

rheumatism, irregularities, and chronic cutaneous diseases, is a matter of course.

*Croft* water is a sparkling and agreeable, though sulphureous water. "Being alterative or aperient, according to the dose, it corrects disordered states of the *digestive organs*, and restores natural secretions when they are depraved," is Mr. Lee's opinion; and Mr. Walker speaks decidedly of their value in prurigo, lepra, and other obstinate skin-diseases.

*Scarborough* has both a chalybeate and a saline spring. "Both waters are calculated to relieve general relaxation *and debility of the digestive organs*, with the loss of muscular tone which that debility induces; a vitiated state of the secretions, torpidity of the liver, chlorosis, where a pure chalybeate would not be well borne, and several nervous disorders connected with impaired digestion, and also scrofulous complaints."—(LEE.) In short, like every other mineral water, these are both beneficial in all those forms of disease, internal or external, which arise from mismanagement of the stomach and the nerves, or are induced by circumstances connected with unfavourable employments, or the dissipations or the monotonies of life, especially among the inhabitants of large towns.

*Woodhall and Ashby* springs consist of brine, containing common salt, with a little carbonic acid, iodine and bromine. It is aperient in full doses, and diuretic in small, and serviceable in scrofula, rheumatism, and certain disorders of the digestive functions.

*Beulah Spa*, Norwood, is aperient, and, as Mr. Lee

observes, well suited to relieve those cases of *indigestion*, depression of spirits, and other consequences, which a residence in a large city so frequently entails. Its chief ingredient is Epsom salt.

*Tonbridge Wells* water is a cold chalybeate, and doubtless beneficial in a high degree, in all mere debility, from whatever cause arising.

Dr. Yeates, as quoted by Dr. Powell, informs us, that "in the degenerated state of the constitution, with depression of spirit produced by a sedentary life with mental exertion, so common to our city merchants, and also the *dyspeptic* state of the literary student, panting for fame in his secluded study, will receive benefit at this place." He honestly adds, however, "It very often happens that nothing is necessary but the advantage of the air, with suitable hours and regimen. The addition of the waters will often be injurious." This remark might generally be extended to the young ladies sent to this place from boarding-school, or the listlessness of a London home, who find a saunter or donkey-ride on the airy common, with a full view of nature in her sunny aspects, and with cheerful companions, to talk of beauty and pleasant days, far more congenial to their pallid cheeks and languid hearts than bumpers of irony water, or even draughts of Griffith's mixture. The consciousness of his own body is what a chronic invalid wants to get rid of, and this is best effected by the use of one's own limbs and senses, in woods and fields, and the socialities of nature; for thus we avoid the sedentary excitement of our own sentimentalisms, and those of books that foster

a busy idleness of idea, and prostrate our physical nature, while they disorder every faculty of our spirits.

*Cheltenham* waters are of two kinds, one highly saline and purgative, alterative or tonic, according to the quantity taken, and the other the most powerful chalybeate in England. We have the usual list of maladies curable with these waters—gout, derangement of liver and stomach, internal congestion, eruptions, want of tone, lowness of spirits, and so forth.

*Leamington* springs are nearly like those of Cheltenham, the saline, however, being a little more energetic, and they are recommended in similar complaints, especially *stomach derangement*, obstructions of the liver, eruptions, and chronic gout and rheumatism, the internal action of the water being aided by warm and shower baths.

Now, from all this testimony in favour of mineral waters, irrespective of all the volumes written concerning the German Spas, what would a man of moderate sense infer? He looks over the list of heterogeneous ingredients contained in the waters, and the mixture of maladies which they all cure, and finds dyspepsia or indigestion the marked disorder, and then comparing the evidence together, he perceives that all chronic diseases are attended by a *habit* of disordered action in the skin, intestines, kidneys, and nerves, so he concludes that a course of treatment that causes evacuation alters this habit, and tends to produce health as a matter of course, provided the strength of the system be in the mean-

time well sustained, and no considerable organic change exist.

All salines, if more saline than the blood, act as aperients and deobstruents ; and on principles before explained, if the appetite, digestion, and assimilation be preserved, the character of the blood, and the power of all the functions, will be improved by their use. If a water having a larger proportion of salt than the blood, such as those of Cheltenham and Leamington, be taken, especially on an empty stomach, it attracts water to itself from the blood through the vessels of the bowels, and thus acts as a watery purgative, diminishing venous congestion, and producing thirst. If water containing a less proportion of salt than the blood contains be taken, it is usually quite absorbed, and acts on the kidneys or the skin according to the amount of exercise and the state of the air. A great dilution of the salts enables them to operate more slowly as alteratives, and thus iron, iodine, and bromine, and perhaps all salts, exert a more general, beneficial, and permanent influence, when taken in a great quantity of water, than they would do in larger or stimulating doses. They are thus admitted into the blood, and circulated to every part of the system.

A century ago, physicians of a quackish order were persuaded that "all salt tastes," to adopt their words, were useful "in obstructions, and crude, slimy, and serous humours;" and in their digestive regimen, they did not limit their recommendations to the springs of Bath and Epsom, but in very plain English, advised patients to drink what may be

called animal mineral water. Thus, Sir John Floyer, Knight, a great authority with our immediate ancestors, prescribed as a thing of course *urinæ vaccæ cyathum amplum æger quotidiè vel pro re natâ sumat*. This was deemed both purgative and tonic, but it was always advised that strong exercise and much friction should be employed to aid the circulation, experience having shown that medicines were of little use towards the cure of chronic disorders without air and exercise—and with such helps, surely pure water will do more good than any of nature's refuse solutions.

The first effect of inactivity in any function essential to life, is to produce a fulness and distention of the veins of the abdominal viscera. If, for instance, the liver fail to secrete bile in due quantity, the vessels of the liver become surcharged; that largest of the glands, the liver, enlarges; the return of the blood to the heart is impeded; the veins of the digestive organs become overloaded; and a tendency to bowel complaints and to dropsy must then be the result. In this state carbon accumulates in the system, and all the secretions are interrupted, even the lymphatics and lacteal vessels are pressed on; the nerves are all disturbed, and the nervous sensations of the dyspeptic and hypochondriacal invalid speedily follow, unless extra action of the kidneys, the skin, the lungs, and the bowels, afford relief to the blood. It would be no difficult task to prove that any considerable impediment to the excretory functions, must tend to induce that state known as abdominal congestion. When this is produced, it excites all

those anomalous symptoms which are so vexatious alike to physicians and patients. Scrofula and consumption are also in no slight degree traceable to a similar condition, especially when occurring in childhood. The most effectual mode of removing this congestive state, is to establish those new habits of action which mineral waters and watering places encourage, by expediting the functions of life, while improving bodily vigour. Abernethy, with his blue pill, rhubarb, senna, gentian, sarsaparilla, and appropriate diets, acted on the same principles, and with similar success, in all constitutional maladies not malignant.

The greater the general activity of function, the greater will be the vigour of nerve and heart, provided the tone and digestive power of the stomach be kept up, for thus assimilation and secretion, waste and supply, will be equalized, and the excretions be steadily maintained.

If the evacuant plan be carried farther than the assimilative powers will well bear, we get a *crisis*, or a general breaking-down of the system; the more recently deposited substances of the body become softened, so that old sores again appear, and bones formerly fractured and soundly united, are again dissevered, just as happens in the excessive use of cold water, and in the depraved condition of blood attending scurvy.

Exercise is the chief auxiliary of the mineral-water treatment, as it directly increases the cutaneous circulation, causes the lungs to act more efficiently, readily disposes of the superabundant carbon, and,

indeed, promotes all those changes in which the vital air operates on the living structure, and evolves that muscular force and nervous energy on which the enjoyment of existence on earth so much depends. Exercise, however, may not be always convenient or sufficient, and then it is that the skill of the physician is most advantageously applied in devising and directing the means of exciting functional activity, while causing an increase rather than a diminution of power, as by purgatives, that lessen the quantity of water in the blood, by baths and frictions that excite the skin, by fluids that cause an equivalent excretion, and whatever else may help to secure a better habit of body and mind. But all purgatives will be unavailing, unless accompanied by a tonic and restorative treatment that may confirm the organs when relieved of their oppression, and enable them to preserve that equilibrium of action known as health. Quacks have learned from the prescriptions of physicians to combine purgatives and tonics as a ready mode of relieving many chronic disorders; but the victims of their pills, not knowing how to stop at the right point, or how to qualify their action, usually abbreviate their lives by continuing the use of the wonderful vegetables they have applauded, and substitute the chronic medicine for the chronic malady, or, as more commonly happens, endure both to the end.

The most successful physicians in the kingdom practise on the principle of promoting tone while relieving congestion, that is to say, they excite function while they maintain and improve power. Thus,

that shrewdest of physicians, the Doctor of Leamington, appeared to many as rather quackish, from the methodical obstinacy with which he constantly prescribed a mixture of purgatives and tonics. But there was pure science in his combinations of sulphuric acid, salts, bitters, and iron ; and he did not trust to these alone, but insisted on his patients doing what many of them had never done before—live regularly, soberly, and actively, and submit to the dictation of strong common sense. Under such management, the over-worked stomachs of ladies and gentlemen of the best breeding, but very bad habits, and quite prematurely old, were indulged with a rest, and then gradually prepared for the efficient discharge of daily duty, by gentle aperients, deobstruents, comfortable tonics, and stomachics, just as the doctor's *copia medicamentorum* might best apply to each particular case. When the patient suffered from an ill-conditioned mucous membrane, a sordid tongue, want of appetite, languid bowels, flatulence, and all the horrors of the nervous dyspeptic, a drachm of diluted sulphuric acid, half an ounce of tincture of ginger, an ounce of Epsom salts, four ounces of compound infusion of gentian, and four ounces of infusion of rhubarb, or something like these, formed the chief mixture ; a sixth part of which was to be taken two hours after breakfast and after tea. If the liver were inactive, blue pill and colocynth began the fray, followed by decoction of dandelion, with some bitter tonic and aperient always conjoined ; and if lymphatic inactivity prevailed, with pallor and feeble pulse, some chalybeate, say a

drachm of “magnetic oxyde” of iron, with three ounces of compound decoction of aloes, a drachm of compound spirit of ammonia, a drachm of bicarbonate of potash, and five ounces of infusion of orange-peel, to be mixed together to form six doses, one to be taken twice a-day; or, in like cases, a little citrate of iron and quinine every day, with a rhubarb pill at night. Of course, the varieties of modes on the same principles are almost infinite, and it requires immense tact, experience, and science, to adapt the medicine to the malady, presented as it is in constitutions and circumstances so extremely diversified as a large practice affords.

Medicines accomplish little alone, and least of all, at a watering-place. Every patient must bathe according to the occasion, and douche, or douse, shower, tepid, warm, hot and cold baths, are prescribed by the doctor, though the waters in draught are not recommended in many instances, except as a motive for a walk before breakfast. From the well-known fact that English stomachs are very much abused, and that all stomachs, when ill at ease, are accustomed to seek soothing by too much fluid and stimulants, the doctor directs a strict diet of rather a dry kind, duly proportioned to the powers of digestion, and the demands of the system. All serious thinkers must be diverted from their thoughts, all idle dreamers from their fancies. “Get up,” says the doctor, “an hour before breakfast, and, if fine, walk out; if foul, walk within, throw open the window, and walk, walk.” “But, Doctor, I shall catch a cold!” “Catch a goose, Madam! dress yourself;

put on your over-all, muff and boa ; take an umbrella if you like ; carry what you will, and walk till breakfast, or until you are weary. At breakfast, take weak black tea, one cup, dry toast, and cold meat, or a new egg ; then lie down an hour ; read—I will send you Dickens or Doddridge ; which do you prefer ? Take the mixture ; bathe ; walk an hour or two if you can ; take lunch—a sandwich, and one glass of sherry mixed with one of water ; then walk again ; then rest on the sofa, and prepare for dinner—mutton chops—no fat—bread, wine and water, mealy potatoes ; rest an hour, and then walk or ride. Lie down a quarter of an hour before tea ; take one or two small cups ; get some chat, and an hour after take a dose of the mixture, and walk again if you can ; and if you must have supper, cold meat and bread, with a glass of wine and water, will do."

Exercise to the amount of power and a really good diet are the main secrets of the treatment, the medicine being of a kind to regulate and strengthen all the functions. The advice of the rare old milk-drinker, Dr. George Cheyne, is, however, never neglected at Leamington and Cheltenham—"I would earnestly recommend to all those afflicted with *nervous* distempers, always to have some innocent *amusement* to employ themselves in, for the rest of the day, after they have employed a sufficient time for *exercise*, to prepare them for their night's quiet rest. It is no matter what it is, provided it be but a *hobby-horse*, and an amusement, and stop the current of reflection and intense thinking, which persons of weak nerves are aptest to run into. The

common division of mankind, into *quick thinkers*, *slow thinkers*, and *no thinkers*, is not without foundation in nature and true philosophy, and therefore ingenious flattering, easy and agreeable amusements, and intervals of no thinking and Swiss-meditation are as necessary for such, as sleep to the weary, or meat to the hungry, else the spring will break, and the sword wear out the scabbard." It is well when the hobby-horse is not the doctor's.

The waters of Leamington had but a small share in rendering that second Cheltenham so fine and fashionable a summer resort for invalids. The tact and talent of the doctor there attracted the blighted and shattered from every corner and colony of Britain to expend their unenjoyed gold for the better blessings of good advice and a renewal of their energies. By adjusting the balance between waste and supply by medicine, exercise, and diet, the attractive and yet despotic doctor seldom failed to cure any chronic disease, except old age, and even upon that he often put a bloom; but acute cases were his dread—they put him out—for the diet, exercise, baths, tonics, and purgatives that cured the sluggish maladies availed only to hasten the decease of those seized with rapid inflammations, and he could not always send them home as he did his hopeless, slow cases.

The success of any watering-place will depend more on the tact with which the doctor follows the plan just stated, than on the virtues of the waters. Any mineral water that excites the excretions, promotes the appetite and invigorates the skin and

intestines, whether it be used as a beverage or a bath, will rarely fail to relieve chronic disease; but pure air, an agreeable country that may encourage exercise, cheerful society, and a wise physician, are essential to the full benefit of the Spa and the season.

There is one remark arising out of the reputation of mineral waters and baths in the cure of dyspepsia, which appears of some importance—they also cure gout and gravel. When we reflect that removal to a very warm climate usually cures these diseases, when the diet is even moderately suitable, and remembering, too, that the natives of the tropical regions are very rarely afflicted by them, and also that dyspepsia is almost invariably relieved, if not removed, by a genial sky, it is but reasonable to infer that the increased activity of the skin, and the free transpiration are the chief causes of these improvements. If so, we can also readily account for the curative effect of thermal and other baths and mineral waters in such cases; since we see that the first evidence of their beneficial action is seen in the improved condition of the skin, a more vigorous cutaneous circulation, unobstructed pores, and, consequently, a sense of general comfort, less susceptibility to cold, a steadier state of stomach, and hence also a less whimsical condition of the nerves, less dreamy slumbers, and that feeling of energy after rest which is the highest sign of health, and the best preparation for the enjoyment of life.

From all the evidence adduced in this volume, we are taught the importance of seeking refreshment for the mind by means that at the same time conduce

to that of the body; and we see that to demand more labour from the stomach than shall suffice to supply the actual wants of the system, is to oppress, enfeeble, and endanger it; and that when the digestive apparatus is disordered by mismanagement, the readiest and most natural modes of relieving it are to favour the excretions of the skin, prevent abdominal congestion, keep the mind and the muscles agreeably employed, and, in short, to live like a rational creature, subject to an animal nature, that cannot be in health but on natural principles—

“And know, whatever cheerful and serene  
Supports the mind, supports the body too.”

## CHAPTER XX.

### THE CAUSES AND CURE OF CONSUMPTION.

THERE are atmospheric influences indicated neither by the barometer nor thermometer, but sufficiently active to make a vast difference in the state of our blood and our feelings. One born and bred where “the mountain breeze was free to blow upon him,” being transported from his rural home to the full city, speedily feels the change in every function; and, indeed, when the eye seeks in vain for pure sunshine, and the snell is assailed by anything but balmy odours, and the brain is drunken with perpetual discords, and the smoke clings to the skin like the smut of a smithery, the departure of bloom from the cheek is no wonder. That children born in the city should there die, or grow up in sickly precociousness, seems but a natural matter of course, for there the elements are evidently arrayed against life. The city climate, however, is a manufactured evil, and by a studious application of science may, by God’s blessing, be removed, and men may learn to

congregate together by millions for the great ends of all polity, without opposing the laws of nature.

But there are evils incident to atmospheric changes which are not to be met by art, and the human body is susceptible to agencies in the air which the chemist cannot test. The influence of climate is best shown by the diseases most prevalent in given districts. The fact that where one form of malady is apt to prevail, other forms are less likely to appear, is of course only a truism, and yet it is a fact much overlooked, though doubtless Providence would thus teach us, as per force, the necessity of studying the conditions of the world we inhabit, if we would promote the welfare of our race. Could we determine what degree of temperature, humidity, pressure, and so forth, would produce any specific disorder in a certain state of body, we might easily infer what would be the conditions requisite for the highest health of that body. This, however, is an extent of knowledge at present beyond our reach, or at least the data are too widely scattered to be yet reduced into practical and working *formulæ*. Certain general truths, however, are recognised: thus the common diseases of tropical regions are sufficiently distinct, on the whole, from those of the north; while the temperate zone includes the conditions that form the links of transition from one extreme to the other. Thus, gravel and stone in the bladder, rheumatism, gout, and structural disease of the heart and great blood-vessels, are comparatively rare in climates in which the heat causes great perspiration;

but, then, in those places disorders of the stomach, intestines, and liver, are frequent, and the nervous system of the European, at least, greatly suffers ; and we shall see, as we proceed, that indigenous consumption and scrofula are by no means scarce in those warm countries to which the subjects of these maladies are often sent from colder climes. A climate that would develop a disease in one person might, however, arrest it in another.

Consumption and typhus fever are the chief causes of death among European soldiers, where the temperature averages less than  $59^{\circ}$ ; and intermittent fevers, dysentery, and diseases of the liver where the isothermal line exceeds that temperature.\* But it should be remarked, that where malignant fever and dysentery are most destructive, as in Sierra Leone, little opportunity can be afforded for the development of a disease comparatively so slow as consumption.

As simple ague is generally curable by removal from the place of its origin, so most diseases of a chronic kind excited by mere residence in any locality are subdued by an opposite situation; thus, disease induced by excessive warmth, is cured by a cooler climate; and that caused by a moist atmosphere, by removal to a drier air. As, however, the *via media* is the safest path to traverse, we must be cautious, while endeavouring to escape the dangers before us, not to turn abruptly round and run into the face of those that come in a contrary direction.

\* Recueil des Memoires de Medicine Militaire, vol. 64.

There is a point, doubtless, at which the forces that war against the body neutralize each other, and the more nearly we approach that point, the more probable will be the restoration of lost health. The least disturbing is the healthiest state, and yet it would be absurdly injurious to aim at ever remaining in a monotony. Let us shun extremes, always remembering that as the world we live in has two poles, so, also, has the living body, and excess depends rather on the condition of the body than on extraneous influences. An exhausted frame may be chilled as by the touch of death, by a breath of cold air that would only agreeably stimulate a strong person, and a plethoric man would be distressed by a degree of warmth that would be most congenial to a weak and impoverished body. Enough has been said in this work to prove that air and temperature present but a portion of the causes to be considered in seeking health, for if a man take with him an injurious habit or a private care, he may ride, he may walk, he may sail, and still the aspect of the heavens, the earth, and the sea will effect but little change within his own world of feeling and of thought—the Old Man will still ride upon his shoulders.

By consumption, medical writers now mean a tuberculous disease of the lungs, and this disease is considered by most pathologists to be of the same character as scrofula, being, in fact, the same disease, (tuberculosis,) modified by the nature of the organ in which the morbid secretion, tubercle, is deposited. Whether this view be correct or not we need not now

inquire, since it is enough for our purpose to observe that any attempt to prevent either of these diseases must be conducted on nearly the same plan, always understanding that the difficulty of treating a chronic and structural disease tending to the entire disorganization of the part attacked, must always be great in proportion to the importance and complication of the organ affected, and therefore when tubercle occurs in the lungs it must be peculiarly obstinate and dangerous. It has been the fashion to doubt whether tubercle of the lungs is ever cured, and, indeed, medical statistics have afforded but slight grounds for the bold promises of those who basely trade in the credulity of the sick. But the case is now better understood and far more encouraging, and both by experience and by the testimony of many trustworthy witnesses, we are well assured of the frequent curability of this disease.

There are, probably, but few medical practitioners who have not seen hard, discoloured scars in the lungs, resulting from the closing up of small cavities produced by the ulceration consequent on tubercular deposit, and this is a sufficient proof that tubercles, when not very extensively developed, may be cured. Even in fatal cases, the efforts of nature to repair the injury are often evident in the adhesion of some cells and the expansion of others, and in the effusion of coagulable lymph whenever the ulcerative process extends to the pleura. It will then be asked, can science effectually assist nature's efforts to cure? Undoubtedly, science works on natural principles, and is successful exactly in proportion as natural

indications are pursued ; but considering the great prevalence, the insidious approach, and the dangerous character of this disease, and knowing that its prevention may be aimed at with more hope than its cure, it is important that certain facts concerning its nature and causes should be generally known.

First, then, we inquire what is tubercle? As a single, isolated, visible object, seen through the microscope, it is, in its early stage, a dull, grey, irregular mass, consisting of a multitude of minute granules; when more advanced, it appears like yellowish curd, with a number of small cells, assuming different shapes, some oral, some spherical, others bean-shaped, serrated, and somewhat flattened, and containing a multitude of equal-sized granules, about  $\frac{1}{2000}$  of a line in diameter. The tubercular mass seems to be quite liquid when first deposited, and is in appearance similar to the lymph effused in inflammation. In its latter stages, it again becomes liquid, the cells almost entirely disappearing, and the granules which they contained floating about entirely free.

Dr. Carswell has proved that tubercular matter in case of pulmonary consumption is usually deposited on the walls of the air-cells, and hence the tubercles take the shape of those cells.

Tuberculous matter, chemically considered, consists of organic and inorganic compounds—1, caseine, fat, and a very small proportion of albumen; 2, chloride of sodium, phosphate of soda, phosphate and carbonate of lime, with a trace of oxide of iron, &c. (S. Casse.) The deposit of tubercle occurs in the

lungs in three forms, the first being in little detached grains, like millet seed, pretty generally diffused through the lungs; the second, in scattered groups of irregular form; the third, in a dense, coherent mass, occupying a large portion, or even the whole of the lung. By the aid of the stethoscope, medical men of fine and learned ear can discriminate between these varieties, and pretty nearly determine the extent and probable course of the malady, the condensation of the lung in different parts affecting the conveyance of the sound produced in breathing, speaking, or by percussion on the chest. Of course, any considerable deposit in the lungs must influence their power of expansion, and therefore the capacity of the chest for air, so that the depression or elevation of the ribs, and the manner of breathing, very much assist the practitioner to judge of the condition of the lungs, especially with the aid of the instrument named spirometer, by which the expanding power of the chest is accurately measured.

Tubercles may be considered as a morbid secretion, incapable of organization, deposited within the air-cells. They act as foreign bodies—just as a shot might do in the same position. We know that a leaden bullet may be embedded in the lungs for years without causing ulceration; so may tubercles, but there is this difference in the cases, tubercle is the result of a predisposition in the body itself not only to produce a few tubercles but to increase them indefinitely, and where they once exist, there is no tendency to cure, as long as that condition of body which first produced them continues. The shot that

kills is, so to say, cast in the body itself, and the object to be attained is the arrest of the process by which the tubercle is continually produced.

Tuberculous matter is formed in the blood, and secreted on mucous and serous surfaces, and among the capillaries of glandular organs, and within the air-cells of the lungs. Dr. Carswell says he has seen tuberculous matter in the act of forming within the cells of the spleen after death, the blood in some cells being converted into a mass of solid fibrine, containing in its centre a small nodule of tuberculous matter. Whence comes it in the blood? Is it born with the individual? M. Guizot opened 400 new-born infants, without meeting a single instance of tubercle; and M. Papavoine examined 820 children, in 528 of whom tubercle existed, but in no case previous to the period of teething. MM. Andral and Dupuy, however, think they have observed it in the fœtus of the sheep and rabbit. But whether tubercle be found at birth or not, it is quite evident that the after-causes of its production must be exceedingly active, since Dr. Guersnet, physician to the Hôpital des Enfans Malades, states that five-sixths of those who die in that establishment are tuberculous.\* We must infer, that some other morbid condition precedes tubercle, some cause in connexion with breathing life, with assimilation, and

\* We have no such institution in England to refer to, but it is to be hoped that the appeals so well made to the benevolence of our metropolis will soon be answered by the means of founding an Hospital for Diseased Children there at least, for there it is wofully wanted.

with those changes carried on between the vital air and the elements of our bodies. We are not, however, to conclude that this disease is independent of hereditary influence, for it is clear that, as a bad constitution is most liable to this affection, so a child that inherits such a constitution must be exposed to all the evil thus entailed. But we lay too great a stress on this derived predisposition, if, with Lugol and others, we attribute the disease entirely to transmission and ill-chosen marriage. All the milch-cows of Paris get tubercle after being housed a few months. Do they derive the tuberculous constitution from their mothers? Nearly all the monkeys brought to England die of consumption. Is that the fault of their parents? Mr. Owen, Professor of Zoology to the Royal College of Surgeons, found tubercle in many animals, from opposite climates, that died in the Zoological Gardens. Did that result from ill-made matches? Rather should we think bad air, deficient exercise, and unsuitable food, were the natural causes of the disorder.

Tubercles have been noticed, even among birds and insects, but only when artificially fed and in confinement. With regard to insects, the facts are curious: Mr. Newport states, that he could produce at will what appeared to be tubercle, by feeding insects on deteriorated food.—(*Phil. Trans.* 1833.) Have we any evidence that like causes produce like effects on the human body? We have. The experiment is tried on a large scale amongst the impoverished and wretched of our great towns, where bad food, bad air, and little wholesome employment,

produce scrofula and consumption with as much certainty as stall-feeding induces similar diseases among city cows. But into this evidence we cannot fully enter now, and it will suffice to indicate that we have reason to conclude, that the numerous causes to which consumption is assigned by hypothetical writers may be all right, and yet all wrong; all right in as far as any one of them may deprave the blood; all wrong, so far as any cause is assumed as the only one. The more immediate condition of the body commonly preceding the deposit of tubercle, speaking from my own observation, is a sluggishness of circulation, with a tendency to enlargement of the abdomen, and a wateriness of the blood. The causes of such a condition have been already indicated, but it cannot be too often enforced, that insufficiency of *good* food, together with want of air, exercise, and cheerfulness, must produce debility and bad blood—that is to say, whatever impedes the vital process by which the oxygenation of the old materials of the body, and the assimilation of new, is carried on, will predispose to consumption and scrofula. My own impression is, that tubercle is most apt to occur among those whose food does not contain a sufficient proportion of saline substance, more particularly common salt, and the salts of potash; and it appears to be an established fact, if we may trust the testimony of Professor Simon of Berlin, and also that of Dubois, that the blood of scrofulous and consumptive persons is marked by a deficiency of saline ingredients. Supposing this view to be correct, it is still evident that many other causes must be in operation towards

the development of tubercle, since, of a multitude dieted in the same manner, only a certain number become the subjects of this disease.

*Bad food*, rather than an insufficient quantity, is generally considered the most frequent cause of tubercle. On this subject, the remarks of Louis are powerful. He states, that of thirty patients whom he carefully examined on this matter, twelve had been badly nourished in infancy, and were frequently afterwards in want of the necessaries of life. In these twelve, consumption was developed between the fifteenth and the fiftieth years, on an average at the age of thirty-one. The remainder had always been abundantly fed, and never suffered privation, yet in these, also, the disease commenced on an average at thirty years and ten months. Want of food is then by no means sufficient of itself to produce tubercle, and indeed it is more consonant with sound physiology to conclude, that an abundant supply of nutriment, without the other conditions of health, is rather favourable than otherwise to the development of tubercle.

Probably the most powerful influence in the production of tubercle is that of impure air, with its common concomitant, want of sunshine. Baudelocque\* says that, from personal experience, he is convinced that scrofulous disease inevitably supervenes where children are confined to small, low, dark, and badly aired apartments, whatever be their advantages in regard to diet and cleanliness. Dr. Clarke observes, that almost all the children reared in the work-

\* *Revue Medicale*, 1832, vol. 1, p. 10.

houses of this country, become scrofulous from the impure atmosphere in which they live, rather than from defective nourishment. The gloomy and confined alleys and courts of large towns, are well known to be the proper *habitat* of scrofula and its kindred maladies. The population of such districts is maintained only by the constant influx of the pauperized of healthier neighbourhoods, who in their turn become the victims of "this broad consumptive plague," and scatter those seeds of death that become so rife among their progeny. Louis, a French physician of great skill, gives us the statistics of many consumptive cases, and says, that the majority of them were of persons who had been brought up in the country, and had worked in the fields, and been induced to come into the city in their youth. Common observation points to the fact, that young artisans, clerks, and shopmen from the country, are very apt to become early victims to this disease, and that, in their case, many causes combine to develop whatever inherent disposition to the malady may have previously existed. A want of invigorating exercise in pure air, while the nervous system is worn and wearied by incessant calls upon their senses and their passions, without a single association to cheer their spirits, except the hope frequently deferred of again visiting the sunny scenes of their childhood, may account for the frequency of consumption among those classes. But we must remember that employment in a city office, or shop, involves the necessity of living not only in impure, but also

darkened air. The importance of space in relation to employment and disease, is seen in Mr. Guy's evidence before the Health of Towns' Commission : Among 104 letter-press printers having less than 500 cubic feet of air to breathe, 13 spat blood, 13 had habitual cough, and 18 were otherwise diseased, making 44 invalids : of 105 having from 500 to 600 feet of air, 5 had spit blood, 4 were subject to colds, and 23 to other diseases, making in all 32 invalids : while out of 100 men having more than 600 feet of air to breathe, 4 only had suffered from spitting of blood, 2 from catarrh, and 18 from other diseases, making a total of 24 invalids.

We have no evidence that clothing, temperature, season, or climate, have any peculiar influence in causing a predisposition to consumption.

It is extremely probable, however, that the use of hard and bad water, containing, as it usually does, a large proportion of sulphate of lime, has a marked effect in predisposing to this disease. Experiment has proved that the use of sulphate of lime in food is capable of causing laborious breathing and calcareous deposits in the lungs, not unlike those which often accompany tubercles, and hence the danger of the common adulteration of flour with this substance. Carbonate and phosphate of lime are always found predominant in tuberculous matter. I can testify that the employment of rain, or other pure water, is very serviceable in the treatment of scrofula and incipient consumption. A superabundance of lime in the water seems to interfere with the admission of

other alkalies into the blood, and disturb the assimilative process.

As the lymphatic temperament, hereditary formation, and bad air, are the most prevalent predisposing causes of tubercle, so, whatever will tend to aggravate these evils, will hasten on the catastrophe. A child either of whose parents may be consumptive, should from birth be nursed by a healthy woman in a pure air, a dry and somewhat elevated situation being preferable; and care should afterwards be taken to proportion the diet to the age and exercise, and to avoid over-stimulation. The clothing should neither be cumbersome nor too cool, and the skin should be fortified from the first by cold sponging and friction. Above all things, avoid the habit of giving medicine, and remember that the best tonic is proper food rightly assimilated by aid of frequent exercise in the open air.

It is well ascertained that deficient nutrition—meaning thereby not so much a deficiency of food as a want of proper assimilation—causes a contraction of the chest, and a diminution of breathing power, not only from insufficient expansion, but also because the affinity of the blood for oxygen is diminished. Whatever lessens the capacity of the lungs, and hinders the elaboration of fibrine from the blood, is apt to cause both a fatty degeneration, and a deposit of tuberculous matter, just as we see in consumptive persons, the fatty substance being deposited in the liver, and the tubercle in the lungs. Here we see the advantage of a warm climate, as allowing more open-air exercise in the winter than can

be enjoyed elsewhere. A consumptive family should move from the locality to which they have been accustomed. Louis mentions the fact, that a family lost sixteen children from this disease, but a seventeenth, sent from his native country at a tender age, escaped. This is, at least, a striking coincidence. Above all, guard against abdominal fulness, which is generally prevented by rather a dry diet, an occasional extra quantity of salt, and by all those means which promote a free circulation of the blood, without disordering the nerves and stomach.

Tubercles destroy the substance of the lungs by exciting inflammation and ulceration in the tissue around them, and therefore the object to be attained, next to overcoming the predisposition to their formation, is to prevent the occurrence of the inflammatory action, and the consequent disorganizing process. Sometimes the disease is very rapid, but commonly very slow, and it is by no means unusual for it to assume great activity for a time, and then for months, and even years, to proceed so slowly as scarcely to afford any symptoms of its presence. It is therefore evident that means exist which not only check the disposition to the formation of tubercles, but also either expedite or retard their progress.

It is very usual to date the incursion of consumption from a cold, or some inflammatory attack of the lungs or windpipe; and influenza and bronchitis are very common precursors. These and the like are what we call exciting causes, that is to say, a predisposing condition being already in existence,

these causes rouse the disorder into action, and produce a more or less rapid development of the specific malady. The manner in which exciting causes act is not exactly known, but the effect is a deposit of the peculiar matter named tubercular in the lungs and other parts of the body most disposed to receive it. Of course it is evident that consumption is not properly a local disease, or confined to the lungs, but yet its chief and most distressing symptoms are referrible to the disorder of those important organs. The direct cause of the fatal result is ulceration of the lungs consequent on a degree of inflammation set up around the tubercles, which, as already stated, act as foreign bodies in the air-cells. Among the most common exciting causes are those attendant on particular employments; thus persons engaged in any business which causes them to breathe much dust are very liable to consumption, more especially if at the same time they are exposed to the other causes productive of congestion and inflammation, such as the improper use of stimulants, and sudden changes of temperature. As an exemplification of this influence, the case of grinders may be adduced. Dr. Knight states that of two hundred and fifty grinders of Sheffield, one hundred and fifty-four laboured under disease of the chest, while only fifty-six of the same number of workmen engaged in other trades were similarly affected. About half the number employed in grinding die under thirty, and not more than thirty-six in three hundred reach the age of forty. Dr. Knight attributes the mortality as much to the powdered grit of the grindstone in the

air breathed, as to the fine particles of metal; and this opinion we conceive to be supported by the prevalence of similar diseases among stone-masons and miners. The pernicious influence of dust as an exciting cause of disease of the lungs is seen in cloth-mills, particularly where old materials are broken up to form what, with coarse propriety, is called devil's dust, which is employed to economize new materials. There is no violence to reason in supposing that the greater prevalence of consumption among sedentary persons and females is partly due to the dusty atmosphere of the house, and it may be that our druggets and carpets are not unjustly charged with being the cause of a greater mortality in consequence of the fine dust of the woollen fibre always floating in the air, as we may see if we watch "the motes that people the sunbeams" when they enter our parlours and drawing-rooms.

The result of our inquiry thus far is to teach us the necessity of avoiding the causes of catarrh and impurity of blood, if we would escape tubercle and consumption. We are thus conducted back to the point from which we started, namely, the influence of climate in a preventive and remedial point of view. The common opinion that the inhabitants of England are more liable to consumption than others, is disproved. Italy and France, in their sunniest plains, are no more exempt from this malady than our cloudy isle; there, too, at least one-sixth of the people perish from the attacks of this insidious foe. In the West Indies, according to Annesley, it is more rife among the blacks than the whites, and at

Ceylon, according to the statement of Dr. Marshall, the natives suffer more frequently from it than foreigners.

The Army returns collected by Major Tulloch present startling results. The mortality from this disease is found to be greatest among our soldiers in the West Indies, and least in Canada and Nova Scotia; and on the dry rock of Gibraltar, and at Malta, it is more fatal than in England; but in the Ionian isles, which are subject to variations of temperature more like our own, it is less prevalent. The test thus afforded could scarcely be less exceptionable, for here we have a number of men in pretty equal condition, about the same age and habits, living nearly on the same diet, subject to similar regulations, and exposed to the same fatigue. Peculiar influences acting on soldiers might be supposed to disturb the conclusion, but the same trustworthy authority states that the mortality from this disease among the native Maltese is  $5\frac{1}{8}$ , and among those of Sweden,  $5\frac{3}{8}$ . These facts, however, are no argument against the value of changing the climate, in order to counteract a predisposition to this disease, for every such change produces a new action of the whole system; but whether the change shall be beneficial or injurious, must depend on the character of the individual case. If tuberculous predisposition come on in a warm, damp, or low situation, there can be little doubt that removal to a more elevated and dryer air would generally be advantageous. In nearly all incipient cases of consumption, a sea-voyage is useful, not only as affording a thorough

change of air, and a saline atmosphere, but as exciting the nervous system in an especial manner, thus diminishing the determination of blood to the lungs, while promoting deep breathing, which undoubtedly are points of great importance, both in the prevention and cure of tubercle of the lungs. Removal from town to country seems an instinctive indication in almost all forms of chronic disease; and the sensations of the patient, as well as the teachings of experience, agree in showing the advantage of residing in the vicinity of the sea in tuberculous affections.

The reasons why the coast is desirable, at least during winter, may be summed up thus:—Sea-air is milder and more equable than the air inland at that season, so that the invalid may be oftener out of doors, and thus enjoy more appetite and cheerfulness. Sea-air is free from dust, and impregnated with saline and other particles, which are proved to be favourable to the removal of congestion.\* My own observation during twelve years residence on the coast, has assured me that sea-air, with suitable appliances, is not only palliative of consumption, but sometimes curative. Where the substance of the lungs, however, is occupied throughout by tubercle, the sunshine of a better world should alone

\* That sea-air contains chlorine may be proved by placing a vessel containing a solution of nitrate of silver near the shore—a white precipitate of chloride of silver is produced. After a strong wind from the sea, I have detected salt on the leaves of the trees two miles from the sea, and more than five hundred feet above its level.

engage the anticipations of the spirit ; yet how often it happens that patients in this state are sent to the coast, and that, too, at the very season when the change is most injurious to them. It is a common thing for some member of a family, on whom the hearts of all are centred, to be tenderly nursed in town during the winter for some disorder of the chest, which in the spring presents every indication of rapid decline ; and then, when the case is very decided and quite hopeless, sea-air is recommended for what wonders it has wrought. The earth is now full of smiles ; ideas of daisied fields, and the perfume of the hawthorn, and the golden gorse, and the dance of sunbeams on the living waters, mingle in the visions with which flattering hope soothes the captive soul, and the dying sufferer, whose loving heart had welcomed death, kindles, as if with new life, at the thought of again beholding the green hills, and the broad, the bright, the boundless joyous sea. The physician, perplexed and unwilling to extinguish hopes so vividly expressed, says, Go. But it is too late ; the change only more quickly leads to death, and that with an immense increase of distress to the whole family ; the invalid is far away from the comforts of home, surrounded by strangers and venal helps ; disease is suddenly aggravated, and the event, which might have been so readily foreseen, seems to take every one by surprise. There remain only the last sad rites, and loud and long reproaches of the injudicious doctor, unheard by him, for he is well known to be so very kind a man that no one ventures to say

to him that a tried heart and a dying body would have been best at home.

When the breathing is short, the pulse frequent, or above  $110^{\circ}$ ; when there is regular hectic about noon daily; when diarrhoea and night-sweat alternate with each other, and the cough is produced on lying down and rising up; when the wasting is rapid, despite a moderate appetite and good diet; when the purulent expectoration is large and spotted with blood, removal to the sea is either too early or too late, and a medical attendant, who fairly examines all the bearings of the case, can alone determine which.

When the disorder is incipient, though the chest may be rather sunken and contracted, the breathings, when quiet and unobserved by the patient, and not above two or three and twenty times in a minute; and when gentle exercise can be taken without instantly hurrying the heart and lungs; and when the cough, expectoration, and hectic, are but slight, there is reason to hope for benefit from a change of air, and a residence near the sea during the winter will be a proper precaution, and likely to lead to permanent improvement.

And oh, it is a glorious thing, and healthful to the soul, for one who feels the unseen world close about him, to wander by the sea, when thoughts are given him that travel as if on a path of light across the waters—from the verge of the great deep into the eternal depth—assuring him, as by vision, that men are spirits—heirs of God, and of his universe. Then how grand the joy to remember Him who walked in

the body upon the waves—who speaks peace, and gives us of his Spirit that we may follow him as our forerunner into the heaven of heavens, and know him as the conqueror of death—the Lord of our immortality and coming glory! But we must not now dwell on the association of earthly sublimities with our higher health, and yet such influences are not to be overlooked in our consideration of the benefits to the sinking body to be derived from visiting the coast; elevating thoughts, pure air, a boundless prospect, and a cheerful sky, are often coöperative in producing the advantages experienced by the consumptive invalid in his residence within sight of the “multitudinous sea.”

The sea does not undergo the same changes of temperature as the land, and when the ground is thoroughly frozen, and in the height of winter, even the surface of the sea, within a quarter of a mile from our southern shores, is at least ten degrees above the freezing point. Hence the air from the sea is comparatively warm during the colder months of the year, and in an abode well sheltered from the northern winds an invalid may scarcely feel the winter, and be able to walk out by the sea-side on sunny and calm days, with great comfort and advantage, when, to take exercise in the open air inland, would be attended with much danger. This advantage is greatest during the severest weather of the winter, and continues only while the land is colder than the sea. At the end of the spring, and during the summer and autumn, the reverse takes place, and chilly consumptive invalids had better then

retire from the sea to some sheltered spot inland, but not quite in a valley. As soon as the warmer air of the land precipitates its vapour in the form of mist on the sea, an inland situation will on the whole be more favourable. The sea-mist may sometimes be seen in the warmer days of May, stretching like an ocean of silvery fleece across the channel, when, a mile inland, or on Dover Cliffs, Fairlight, or any of the Downs, the prospect is one glorious sunshine.

I have known the thermometer as high as  $72^{\circ}$  in the shade, and in the open air, a few yards from the beach at Hastings, when the air in a boat half a mile off was  $45^{\circ}$ . It is therefore evident that an invalid, during a few minutes walk along the shore on a fine spring-day, might experience dangerously rapid and great variations of temperature. In short, the sudden changes of temperature from the strong draughts and peculiar currents and tides of air on the coast, require that a delicate person should exercise forethought and tact in the choice of his perambulations, and keep his eye to the wind like a sailor.

There are a few inconveniences which invalids must at first calculate on in residing near the sea. The constant murmur of the waves, which is heard particularly in the night, is often complained of as a cause of restlessness, but the ear usually gets familiar to the sound in a few days, and it then tends rather to soothe the brain, and to promote profounder sleep. The nervous headache to which most weakly persons suffering from bad blood or defective circulation are subject, is often excited by the bright and glittering

light reflected from the sea, especially in calm sunshine, for then the ocean appears even more brilliant than the sky itself. This brightness, though peculiarly calculated to promote cheerfulness, and very favourable to the action of the heart and nerves of convalescents in general, is yet at first too stimulating to the brain of many invalids, and therefore when it is felt to be inconvenient, it will be better to soften its influence by glasses of a neutral, a green, or a blue tint. Those who suffer from strumous inflammation of the eye—a frequent attendant on the consumptive habit—commonly find the light and the sea-air together very painfully exciting, particularly in the spring; but yet the chronic, inflammatory action of that disease, if not too severe to be safely increased a little, is likely to be cured by gradually accustoming the eye to the excitement.

The spots in England thought most congenial to consumptive patients are Torquay, Undercliff, and Hastings. For the dyspeptic, gouty, or rheumatic subject, Bath and Clifton are perhaps more suitable. In winter temperature, Undercliff and Torquay are nearly equal, but in the summer, Undercliff is five degrees cooler on the average, so that on the whole it might be better as a permanent residence for a consumptive family.

The mean temperature and the quantity of rain falling annually in any place give at the best but a slight and incorrect notion of its climate, as the frequency with which the rain falls, the character of the prevailing winds, the nature of the soil, the degree of shelter afforded by the neighbouring hills,

the elevation of the lodging from the sea, and many other particular circumstances, should all be taken into the account. From a sufficient experience of Devon and Sussex, my impression is in favour of Hastings from December to April, for one who can saunter out a little on a fine day, but has not strength to ride on horseback. For one who can bear horse exercise, Torquay would be preferable. Hastings has the advantage of being quite shut in to the sea, and hence it has quite a sea-air and sea-smell. One who has a delicate state of chest should choose a lodging facing the sea, under the hill which rises like a wall to the north of the Parade. Here the sun shines with great power, frost is rarely felt, and snow scarcely ever seen; a dry, smooth walk is close at hand, and the waves at one's feet, kissing the pebbly beach, decked with diamonds, and making obeisance as they bound along.

At Hastings there is no black mud reeking most unbalsamically in the sunshine, and the climate is of a more continental character than either that of Torquay or Undercliff; the rain is less frequent, but it falls more heavily both in spring and autumn, the soil, however, being sandy, a heavy rain makes little impression, and is soon absorbed and lost.

Sir James Clarke, in his treatise on the Curative Influence of Climate, has supplied us with the most extensive information, and the best analysis on the subject which we possess, but still the intelligence to be derived from even the best books requires the discriminating judgment of tried experience properly to apply it, and therefore the opinion of a consi-

derate physician should always be sought concerning the choice of a winter residence, especially for a consumptive invalid; for a little quiet advice, founded on a knowledge of the particular case, is worth more than a whole library of local description and medical statistics. There is one important fact, however, that ought always to be borne in mind—the consumptive tendency is always likely to be checked just in proportion to the earliness of the stage at which the change of climate is sought. This is well exemplified in the experience of Dr. Renton, an English practitioner in Madeira, who says, that of thirty-three cases of *incipient* consumption, in the first stage, sent out to him in one year, twenty-four returned to England apparently cured, but nineteen cases of *confirmed* consumption sent out in the year were all fatal.

The chief effects of a change from a cold to a warm atmosphere are evinced in the greater activity of the liver and skin, which, as we have already seen, are both subsidiary to the lungs in relieving the blood of carbon, and expediting those changes on which life depends, and in proportion to the rapidity of which bodily vigour is usually manifested. We must also remember, that warm air relieves the internal organs when congested, by producing determination to the surface, allows the invalid to take exercise without chill or hurry, facilitates the expansion of the lungs without proportionately increasing their labour, and thus enables the part impaired to assume a healthier activity.

With regard to the use of the respirator as a

mean of raising the temperature of the air admitted to the lungs, there are reasons, not a few, for believing that it has been too hastily and indiscriminately adopted. In many cases it is valuable in allaying the irritation of the mucous membrane lining the throat and wind-pipe, and thus preventing or diminishing cough, but it is capable of doing mischief. When we consider that the action of the oxygen on the blood, and the removal of carbonic acid by breathing, is effected, according to the common law of diffusion, by which gases mix together inversely as the square roots of their densities, it is evident that to respire air warmed nearly to the temperature of the body must have an effect rather prejudicial than otherwise to the lungs. It is like breathing the air of the tropics while the exterior of the body may perhaps be exposed to a frosty temperature; the lungs labour more, but with diminished power, and the consequence is often seen in a more hectic cheek, and increase of distress on taking even the slightest exercise. The habit of using such a guard on all occasions may, therefore, hurry on an incipient consumption, but can exert no positively curative influence in any form of that disease—it can do nothing towards improving the constitutional condition.

We should remember that the lungs always contain a reserve of air in their cells. In a healthy man this reserve amounts to nearly twelve pints, but in disease of the organs of respiration this quantity is greatly diminished, and in advanced consumption more than a half of the lungs often becomes useless,

and the remainder but ill-adapted to its function. In health, about one pint of air is inspired at each breath, and about a fourth of it is decomposed; but in consumption it often happens that not an eighth of the respired oxygen is changed. It is, then, of vast importance in this disease that the air should be admitted to the lungs as freely as possible, and the vital chemistry of respiration be promoted to the utmost. But what happens when a respirator of high power is worn? The air is drawn in nearly as warm as it is exhaled, so that not only is a smaller quantity of air inspired in consequence of its rarefaction, but the removal of that reserved in the lungs is retarded by the admission of air nearly of the same density instead of such as is naturally supplied. If we would subdue the rapid pulse, the hectic fever, the distress of the consumptive patient, we must invigorate the skin, and let the air he breathes be moderately cool and free from damp.

The medicinal remedies of consumption are innumerable, and, as might be expected, they possess more of a palliative than a curative character. Incidental recovery under the use of any chosen medicament, however, often gives rise to enthusiastic hopes and proud vauntings of success never again to be realized by the use of that means. Thus it has been with the salts and the alkalies, the issues, the small bleedings, the opiates and sedatives, the inhalation of vapours, the breathing of gases, the use of iron, iodine, creosote, and naphtha; the lotions and liniments, mineral waters, milk, seeds and bitters, pulmonic wafers and infallible specifics.

The most opposite and contrary methods may all have succeeded sometimes, but only by hap-hazard, just as the dreamers who hunt for hidden treasure may once in an age strike upon the crock of gold, leaving their successors only the more deluded and the less lucky. Of the thousands of palliatives some certainly promise great benefit in this disease, and, indeed, some have approved themselves beyond dispute to be most valuable; of the propriety of employing them, however, in any particular case, medical practitioners of experience and skill are alone capable of judging. M. Louis gives us the history of a multitude of cases with very exact statistics, but, after all, he says, "In the curability of the disease we have made but little progress; in the cases of cure hitherto known, the morbid state has always been very limited in extent." In the French hospitals, Sisters of Charity notwithstanding, the incurability of consumption is certainly no wonder, for both diet and medicines are, or used to be, commonly sloppy in the extreme. The report of one of our hospitals for consumptive patients, that at Brompton, shows something more substantial and encouraging, for in this institution a combination of the best means are made to bear upon the poor inmates of its wards, such as excellent ventilation, comfortable warmth, order and quiet, religious and cheering books, careful dieting, watchful nursing, and the best medical skill, aiming always and only at cure. We want in connexion with this institution an hospital similarly managed in some sheltered spot on the south coast, and another inland to suit

particular cases, and to serve as convalescent retreats both in winter and summer, according to circumstances. But the point to which we desire especially to call attention is the large success of the treatment adopted in this institution, and which will best be seen if we analyze the report of the physicians published in 1849. The number of patients was 4358, of which only 888 were in-patients. 61 per cent. were males. Most of the cases occurred between the ages of 25 and 35, the liability of the female being greatest under 25, the reverse being the case after 35. Females seem to inherit the disease more frequently than males. Daughters more frequently inherited it from their mothers, sons from their fathers. One half of the patients experienced a diminution of the more distressing symptoms; 40 per cent. had all the principal symptoms removed, and in 12 per cent. of males, and 7 per cent. of females, the disease was to all appearance cured. The most encouraging feature of the report is the fact, that of 542 cases—293 of whom were in the first stage of the malady, and 249 in the second and third stages—cod-liver oil was exhibited, and that out of these, 72 per cent. of the males, and 62 per cent. of the females, in the first class, the symptoms were greatly mitigated, and in the second and third class 18 per cent. of the males, and 28 per cent. of the females, were to all appearance cured.

It is curious and instructive to observe how experience and true science are constantly leading mankind back to the right methods from which fancy and hypothesis are as constantly diverting them.

When a better knowledge of morbid anatomy enabled physicians to determine the exact physical condition produced by tubercle of the lungs, not seeing how they might meet it on the physiological principles then known to them, they for the most part began to assert, that true consumption was incurable, and thus the testimony of honest men was disregarded. "A little knowledge is a dangerous thing" when confidently trusted; but a little is better than none, if we sincerely endeavour to increase it. By patiently following out the indications of experience on scientific principles, physicians are now beginning to understand and appreciate the methods on which consumption long ago was treated, and in a great measure the medicines that were in vogue among our forefathers in such complaints, are again resorted to with advantage. This is exemplified in the discussion concerning the use of oil in tubercle; it now appears that other oil than that of the cod's liver is found to be efficacious. Dr. Duncan, and Mr. Nunn have tried the oil of almonds in the treatment of consumption and scrofula, at the Essex and Colchester Hospitals, and they state that, in upwards of 250 well-observed cases, this oil acted quite as beneficially as cod-liver oil, vastly improving the powers of nutrition, and speedily relieving the symptoms resulting from a vitiated state of the blood. Thus, we are reverting to the practice of our forefathers: almond oil was precisely the favourite remedy for tuberculous consumption prescribed by Sir Richard Blackmore, who published a sensible book on the subject in 1724. This is his recipe:—Oil of sweet

almonds, new, two ounces ; of syrup of maiden-hair and marsh-mallows each an ounce ; of saffron, half a scruple, and as much white sugar as will make it, by good mixing, into a linetus. A spoonful of this to be taken three or four times a-day, and followed by a draught of linseed tea. He says that linseed-oil, cold drawn, is equally useful, and we find he prescribed them together occasionally. Now, there was very little science in Sir Richard's prescriptions, but still there is the fact—the old doctors said they cured consumption sometimes, and now we believe it possible. We, too, have been acting with the same empiricism as our lady friends in our copious prescriptions of almond emulsion in coughs and catarrhs, and perhaps by-and-by we shall adopt the anointings with goose-grease, hog's marrow and lard, which wise village dames, in imitation of the doctors of former ages, recommend in diseases of the lungs.

We should commit an egregious error, if we fancied that any oil can act as a specific remedy on the tuberculated lungs—two cases can scarcely be treated safely in precisely the same manner. If the liver be disordered, which it often is, the oil does mischief ; and it does not appear that almond oil is less liable to objection on that score than cod's-liver oil. The simplest medicine requires to be exhibited in accommodation to the particular case ; but although one kind of oil may sometimes be preferable to another in certain states of the lungs, still we have really no sufficient evidence that any other oil would be equally efficacious with that of the cod's liver in

tubercle. Other oils might equally promote the nutritive process, and excite the lungs to full activity ; but we have reason to believe that no other is known that operates so favourably as a *deobstruent*, by exciting the absorbent system. It contains a demonstrable proportion of iodine and other active ingredients ; and moreover, as a fish-oil, it possesses properties not observed in other oils ; its acids do not appear to be convertible like those of other oils ; and they seem to permeate and pervade every part of the body undecomposed, and to be recognised by their smell and other qualities in the blood of persons who take the oil. It has an abundance of *elaine* in its composition, a substance that does not solidify at less than 20° below the freezing point, and perhaps it is this substance that favours the solution and removal of tubercles, by uniting with the *stearine* found in them, and which is solid at the temperature of the body, and, indeed, does not liquefy below 158°. But there are villains in trade who are largely practising homicidal deception, and everywhere a fine mixture of all sorts of fish-oils, clarified by chemical art, is selling for the best cod-liver oil. This villany is the more unpardonable, since it may bring a valuable remedy into disrepute.

It would seem that oil is a medicine that might be used without the help of a physician ; it may ; but a few considerations will prove that he who would trust to his own judgment, and the advice of ignorance in this matter, is not wise. It is true, that where the stomach is sound, the power of taking exercise considerable, the liver active, and the skin pretty

healthy, a tea-spoonful or two of oil may be safely and perhaps advantageously swallowed twice a-day for months together; yet where disease disturbs every function, as in consumption, a little medical watching will be of vast value towards the important end in view. I venture to add a few hints derived from my experience in the use of this oil; but these hints are thrown out rather with the hope that some of my medical brethren may see them, than with any intention of encouraging a diseased man to quack himself. The oil is very apt to produce bilious sickness if much fluid be taken, especially after vegetable acid. If it be continued without interruption, an increasing feverishness may usually be observed at the end of a week or eight days. This may be obviated by omitting it altogether every fourth or fifth day, and that with improvement as to its general effects. Congestion, or even inflammation of the lungs, may be excited by giving the oil too freely, or while the lungs are in a state which renders them incapable of disposing of the super-abundant carbon supplied to them. In this case, the total suspension of the remedy is necessary until the disordered action be subdued, which I have observed to be most speedily effected by the exhibition of a solution of potash in very small doses frequently repeated, and mixed with a considerable quantity of gum-water. As a general rule, the use of the oil must be suspended if there be spitting of blood; but still, with careful management, this symptom does not prevent the oil from being employed with curative effect.

Diarrhœa is a common concomitant of consumption, and is often very troublesome and intractable ; the oil sometimes produces this complaint, but in a form somewhat differing from that which spontaneously arises. In either case astringents do mischief, and it is best relieved by a small dose of compound rhubarb pill.

On the whole, we conclude that the causes of fatality in that formidable and most prevalent disease—consumption, are now better understood than hitherto ; and what is more to the purpose, we possess the means not only of counteracting the tuberculous tendency, but of controlling it in a great degree, even when fully established. The essential similarity between consumption and scrofula, so far as tuberculous deposit distinguishes them, is proved ; scrofulous affections of a superficial kind are, however, so rare in consumptive persons, that of three hundred and thirty-two such persons, examined by Mr. Phillips, at the St. Marylebone Infirmary, only seven presented scars resulting from scrofula. They are both apt to become hereditary in connexion with a bad constitution of the blood ; but they are not infectious, and the means best suited to prevent the development, and to promote the cure of the one, are equally adapted to the other also. A genial climate, pure air, nutritious food, agreeable employment of body and mind, and all such measures as contribute to the formation of pure blood, and facilitate its changes, tend to prevent *tuberculosis* ; and the best remedy of that malady yet recommended by science and experience is cod's-liver oil, not, however.

to the exclusion of other medicines, but as the most direct means of removing tubercle in any part of the body.

With this most frequent and fatal malady we abruptly, but not inappropriately, close an inquiry which in itself is endless. The agencies engaged in maintaining and disturbing life are innumerable; the universe seems to our imagination as if existing in an infinite antagonism, and we are borne on the wing of thought beyond the body in our search for the source of health and the causes of disorder. We feel that the mere fact of existence involves eternal consequences; our earthly estate seems to vanish like a dream—all things are gone—we are left with our God. On Him we hang alone and altogether—He willed our being, and we are—our dependence is that of mind on Mind—the thinking creature on Everlasting Intelligence—that is our relationship—in Him we possess all; His Spirit in us is—Goodness, subduing evil—Light, dispelling darkness—Life, destroying death, and thus He is our Health, and that for ever.

THE END.









B.P.L. Undery  
Dec 10-1896

